Innovation and the City in the Era of the Knowledge Economy

by

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Declaration

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Opsomming

Innovasie kan gedefinieer word as ’n proses bestaande uit radikale en inkrementele veranderinge in denkpatrone, in ‘n proses, produkte en dienste wat uiting kry in die ontwikkeling van nuwe prosesse, produkte en dienste op ‘n globale skaal. Die aard van hierdie “proses” onderskei dit van soortgelyke prosesse rakende ontwikkeling en mededingendheid waarmee dit menigmaal verwar word.

Stede word dikwels beskou as die ideale (en mees waarskynlike) gebiede waar innovasie in ’n geglobaliseerde wêreld kan plaasvind, vanweë hul unieke karaktereienskappe en die uitdagings wat hulle in die gesig staar. In die verlede was stede slegs belas met die belange van hul inwoners, maar hedendaagse stede moet dikwels ander uitdagings, soos strawwe kompetisie vir beleggings, kennis en toeriste, teen ander stede die hoof bied. Terselfdertyd, word daar van stede in die 21ste eeu verwag om stedelike kulture te ontwikkel wat bevorderlik is vir ’n kennis-gebaseerde ekonomie en leefstyl.

Teen hierdie agtergrond was die doel van hierdie tesis om die aard van die verhouding tussen innovasie en stede te bepaal (hoofstuk 1). Die gekose navorsingsmetodologie het die kritiese analise van kernkonsepte behels, naamlik stede (hoofstuk 2), innovasie (hoofstuk 3) en die verhouding tussen stede en innovasie in die kennisekonomie (hoofstuk 4). Op grond van hierdie analise, het die navorser aanbevelings en voorstelle rakende innovasie-beleide in stede gepostuleer en geformuleer (hoofstuk 5). Op hierdie manier, kon die grondslag gelê word vir die toekomstige ontwikkeling van ’n beleid vir innovasie in ontwikkelende stede (hoofstuk 6).

Summary

Innovation can be defined as a process whereby radical and incremental changes in thinking, in a process and in services lead to novel processes, products and services on a global scale. The nature of this "process" distinguishes it from similar processes concerning development and competitiveness with which it is often confused.

Given their unique characteristics and challenges, cities are often the ideal and most likely sites for innovation in a globalised world. In the past, cities were mainly tasked with managing the affairs of their citizens. However, modern-day cities often find themselves facing more significant challenges, such as competing with other cities for investment, knowledge and tourists. In addition, cities in the 21st century are challenged to develop city cultures that are conducive to a knowledge-based economy and lifestyle.

Against this background, the purpose of this thesis was to determine the relationship between innovation and cities in a knowledge-based economy (chapter 1). The chosen research methodology entailed critically analysing core concepts, namely cities (chapter 2), innovation (chapter 3), and the relationship between cities and innovation in the knowledge economy (chapter 4). Based on this, the researcher proceeded to postulate recommendations and suggestions for policies of innovation in cities (chapter 5). In so doing, the foundation was laid for the future development of a policy regarding innovation in developing cities (chapter 6).

Acknowledgements

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Finally, I would like to dedicate this thesis to my late mother, Nomso Sibeko. The immense strength of character that she demonstrated during my family's hard times has been my great inspiration. The legacy she left needs to be sustained.

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List of Acronyms

ANIRDC	Annual International Rural Development Conference
APEC	Asia Pacific Economic Co-operation
ATP	Advance Technology Program
BCDA	Buffalo City Development Agency
BCM	Buffalo City Municipality
BRT	Bus Rapid Transit
CPPC	City product per capita
CSIR	Council for Science and Industrial Research
ICC	International Convention Centre
IDP	Integrated Development Plan
IKS	Indigenous Knowledge Systems
IRI	Industrial Research Institute
JDA	Johannesburg Development Agency
MPA	Maritime Port Authority
NSTU	Northwest Sci-Tech University of Agriculture and Forestry
OECD	Organisation for Economic Co-operation and Development
PAU	Punjab Agricultural University
PPP	Purchasing power parity
SME	Small and Medium size Enterprises
SMME	Small, Medium and Micro Enterprises
TUT	Tshwane University of Technology
UNSC	United Nations Security Council
WEF	World Economic Forum
WSU	Walter Sisulu University

Chapter One

Introduction

1.1 Definitions – Innovation, Cities and the Knowledge Economy

This thesis is about the relationship between innovation and cities if we assume a context defined as the knowledge economy. This relationship has become more than just a matter of fact, but a vital factor, as we move more and more into the knowledge economy. Therefore, it is appropriate to start with short definitions of the key concepts of this thesis.

Innovation

The term "innovation" has had several different meanings throughout the years. According to Jeff De Cagna, innovation has been defined as: an outcome; an experience that permeates a whole organisation over time; an introduction of a new "thing" or method; and a process.[1]

In the context of this thesis, innovation is defined as a process comprising radical and incremental changes in thinking, processes and services that lead to novel processes, products and services. This "process" involves a deliberate application of knowledge, imagination and initiatives in deriving greater or different values from available resources.[2] It encompasses all processes through which new ideas are generated and converted into useful products or services.[3] Moreover, it involves multiple activities performed by multiple actions from one, or several, organisations.[4] Therefore, to call a process an "innovation" means that the underlying idea must be replicable at an economical cost and must satisfy the needs of significant audiences.

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[1] De Cagna Jeff, 2007, pg 5

[2] De Cagna Jeff, 2007, pg 3

[3] Yeo B J K, 2010, pg 73

[4] Mckeown Max, 2008, (www.wikipedia.org/wiki/innovation accessed on 10-03-2009)

City

To the researcher's knowledge there is, currently, no agreed-upon formal definition of what constitutes a "city." Such definitions are usually context-bound and differ from municipality to municipality and country to country. However, in more general terms, "a city is defined as a large permanent urban settlement",[5] or "a city is a large and important town,"[6] which has central places of trading for the benefit of inhabitants living in close proximity. After the industrial revolution, urban centres grew rapidly,[7] both in numbers and in size.[8] Through urbanisation, ordinary urban centres were transformed into centres of economic growth, technological advances and cultural production.[9] Cities started to play a prominent role in people's lives and in world civilisation in general. Cities also differed from "towns" in that they usually had a cathedral and received special rights from a king or queen.[10] In ancient times, cities were usually surrounded by a city wall and a defensive canal, for example Jerusalem.[11] In constrast to this, a "town" comprised a living space, with a place of worship, such as a church or mosque, a town square, a central market and a town hall.

However, to arrive at a modern day definition of "city" is slightly more problematic. Cities are no longer delimited by walls and, today, most settlements have a place of worship, a market and a town hall. In general, many cities have their administrative, legal or historical status based on their local laws. In this instance, an example is the city of London, which has less than seven million inhabitants, but is not considered a metropolitan region according to local regulations, because it does not have a population of 12.5 million![12]

The development of countries has been characterised by cities.[13] Cities have become atoms (economic entities) of the countries:

> Every urban sector appears, more often as one atom in the complex molecule that is the European city and all actions must be taken into account, the impact of all urban

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[5] Goodall B, 1987. *The Pengiun Dictionary of Human Geography*, London: Penguin

[6] Hornby A S, 2005. Oxford advanced learner's dictionary, pg 255

[7] Heilbroner R L and Milberg W, 2001, pg 81

[8] Heilbroner R L and Milberg W, 2001, pg 93

[9] Heilbroner R L and Milberg W, 2001, pg 82

[10] Hornby A S, 2005. Oxford Advanced Learner's Dictionary, pg 255

[11] Hornby A S, 2005. Oxford Advanced Learner's Dictionary, pg 255

[12] Childe V G, 2008, pgs 3-19

[13] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

> data and policies always bearing in mind the necessity of insertion on the whole. The big challenge is the complexity of reality.[14]

Cities are economic entities and they always offer hope of a better life for all the people around the globe; especially in these trying times when the world is rapidly changing and becoming volatile. This is in consideration of the economy, climate change, poverty, HIV/AIDS, etc. These factors have resulted in urbanisation in most countries of the world. Urbanisation brings positive and negative impacts to the cities. For example, strong fears and anxiety stalk many cities in the United States (US). Because these cities purportedly face a new grim and stark reality, together with hovering dark and deepening global times waiting to batter and threaten their economic fortunes. This is due to the looming recession, which broke out in mid-2008 in the US and European countries.

Knowledge Economy

The Knowledge Economy is an economic configuration that values knowledge as a key factor in production; production and services are based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance. In an economy of this nature, labour is replaced by machines,[15] and information technology becomes the locus in knowledge economy (codified knowledge). As codified knowledge increases, this leads to an increase in the digitilisation of information and commodification.[16] Codification of knowledge also leads to a world-wide transmission of knowledge without incurring high costs.[17]

Knowledge economy relies on intellectual capabilities, rather than on physical inputs or natural resources. This comprises the diffusion of knowledge, use of knowledge, and the creation of new knowledge, which is accelerated by the rate of change and the rate of learning. In this manner, the knowledge economy impacts on skills, learning, organisation and innovation.

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14 Kelly P Ruth and Ratcliffe S John, 2006, pg 49

15 Heilbroner R L and Milberg W, 2001, pgs 59-61

16 Berg L and Winden W, 2004, pg 8

17 Berg L and Winden W, 2004, pg 8

1.2 Research Question

The question which drives this thesis is: *What is the relationship between cities and innovation if it is assumed that the context of 21st century cities is best described as being the "knowledge economy"?*

At the root of this question lies the notion of innovation, which is mainly centred on the structures and systemic dimensions of innovations. Structures of innovation are used as a framework to understand innovation, while systemic dimensions of innovations are used to describe the factors and components that explain innovation.

For the purposes of this study, it is assumed that innovation is a necessary activity in cities' knowledge economy. This assumption is made on the basis of population dynamics, an increase in urbanisation, the proximity and volatility of markets, and population density of modern cities. The effect that these developments have on cities in the globalised world and on the potential of innovation for economic growth, makes it all the more important to consider the research question posed. For example, Montana J. notes: "The capacity to innovate is not just for current technology hot spots like Boston, Austin and Silicon Valley. It is relevant to any region that sees the importance of building the capacity for continuous re-invention, which is needed to keep pace in today's rapidly changing world."[18]

1.3 Research Scope and Methodology

This thesis is the outcome of *conceptual research,* which revolved around the three notions: a) innovation, b) the city, and c) the knowledge economy.

Being a conceptual study, this thesis seeks to attain a deeper than common understanding of these three notions, with the purpose of conceptualising a *productive relationship* between them.

The following factors and delimitations played a role in the construction of the thesis.

Firstly, it is not the purpose of this thesis to provide exhaustive analyses (neither empirical, nor literature-based) of any of the three core concepts. Neither the nature (see the next point) nor the volume of the available literature makes such a purpose a sensible undertaking. What follows is an attempt to articulate each one adequately enough to be able to show how a productive relationship could be established between them.

[18] Montana J, 2001, pg 11

Secondly, the construction of a conceptual thesis depends heavily on a solid literature support that formulates solid foundational theoretical "tools". However, in the case of the presented topic, there is *no comprehensive or even potentially comprehensive school of thought* or theory in literature. What literature presents is a wide variety of scattered perspectives that rarely focus on the relationship between cities, innovation and the knowledge economy. One of the main challenges during the research process was to reap useful insights for the topic from such a vast, but very scattered, array of perspectives.

Thirdly, of course, this puts the onus on the researcher to provide coherence where none exists in available literature. In the end, a focus on the Triple Helix notion seemed the best solution in the search for some form of synthesis. For this reason, from a research theoretical perspective, *a multi-perspective approach* was followed in this thesis. Given the absence of dominant and comprehensive theories with respect to the topic of the thesis, a multi-perspective approach offers the best opportunity to discover possible conceptual building blocks for a future coherent theory.

Fourthly, instead of departing from a hypothesis, this thesis builds up to one. In other words, this is a thesis that follows *inductive logic*. The outcome of the thesis is the hypothesis that the Triple Helix Model is a plausible conceptual framework within which cities, such as East London and Mthatha, could fruitfully shape themselves into mature participants in the knowledge economy.

Fifthly, the topic, although conceptual, cannot be adequately analysed if references to real cities are excluded. For that reason, examples are drawn from European and Asian cities but, in this thesis, the main "templates" for a city are Mthatha and East London. However, it must be clear that references to these cities do not pretend to provide exhaustive analysis. They function more as the canvas onto which the notion of a Triple Helix is superimposed.

It also follows that the selection of international cities is selective. Once again, it must be stated that it is not the purpose of this thesis (nor is it feasible) to provide a comprehensive analysis of the state of the world in respect of cities and innovation in the knowledge economy. Such cities, as covered in the thesis, were selected to illustrate specific notions that influence our conceptualisation of the relationship between the three core concepts.

Finally, this thesis is presented with the full understanding that the topic is inherently complex and that all attempts to answer the posed question is always open to alternatives. In that sense, this thesis can be viewed as an elaborate construction of a hypothesis which can

only be verified in practice, if the template cities should choose to implement the Triple Helix model.

1.4 Thesis Outline

The remainder of this thesis is outlined as follows:

Chapter two presents an in-depth description of the concepts "city" and "knowledge economy" and explores the link between these two concepts.

Chapter three further defines and describes the concept of "innovation" and its role in the "knowledge economy".

Chapter four outlines the relationship between "cities" and "innovation" in the era of the "knowledge economy".

Chapter five analyses the postulated aspects and policies of innovation to promote an innovative urban culture in the knowledge economy.

Chapter six outlines the recommendations towards policies for innovation in developing cities and provides suggestions for future research.

Chapter Two

Cities and the Knowledge Economy

2.1 Introduction

The objective of this thesis is to elucidate the relationship between cities and innovation. In this context, "innovation" is regarded as a process and "cities" as the prime centres that facilitate this process in a knowledge economy. For this purpose, the researcher conducted a conceptual study, which entailed critically analysing and reviewing the literature on cities, innovation, and the knowledge economy in a manner that incorporates multiple views from different authors.

This chapter has been divided into two major parts. In the first part, the phenomenon of a (modern) "city" is explored from a variety of angles. The purpose of the second part is to further define and describe the notion of the "knowledge economy" and explore the nature of the relationship between this concept and that of a "city".

2.2 The Notion of Cities

Bairoch states that, although there were basic mechanisms (such as agricultural and urban primacy) that initiated city formation, there is no clear evidence in world history what accounts for the rise of cities.[19] During the pre-Neolithic Revolution, population densities in towns were low mostly because communities consisted of hunter-gatherer societies.[20] Agricultural activities brought people together through the creation of jobs and the trading of goods[21] and denser populations started to form in certain areas.

[19] Bairoch P, 1988, pgs 3-4

[20] Bairoch P, 1988, pgs 3-4

[21] Jacobs J, 1969, pg 23

The Neolithic Revolution supported city development through agriculture, and this led to an increase in population density encouraged by farming.[22] True cities became considered as large settlements, where inhabitants were no longer farmers of the surrounding area, but began to take on specialised occupations.[23] A city became a place where trade, food storage and power were centralised.[24] It accomplished its goals through informal agreements between inhabitants and city managers. Cities were characterised by professional administrators' regulations, and some form of taxation fed the government workers.[25] Government was based on heredity, religion, military power, work projects, food distribution, land ownership, agriculture, commerce, manufacturing and finances.[26]

According to Childe, ancient cities were defined historically by the following general metrics:[27] above normal size and density of the population; the population was differentiated (leading to specialities in occupation); taxes were paid to a deity or king; monumental public buildings were visible; the king supported people who were not producing their own food; systems of recording, writing and practical science were in place; symbolic art was developed; trade was practised and raw materials imported; and specialist craftsmen from outside the kin-group were present.

Mainly two types of cities can be classified: those that primarily originate from economic factors, such as London, Mumbai, New York City, Paris, Tokyo, Hong Kong, Johannesburg, East London, Mthatha, Singapore, Shanghai, etc.; and cities that are influenced by religion and historical monuments, such as Rome, Beijing, New Delhi, Mecca, Istanbul, Mashhad, Karbala, Jerusalem, Lisbon, etc.[28] This essay is particularly concerned with cities influenced by economic factors.

Cities that have been influenced by economic factors generate positive and negative effects for their inhabitants. The positive effects comprise two aspects: close physical proximity (which facilitates knowledge spill-overs, and helps people and firms to exchange information

[22] Bairoch P, 1988, pgs 3-4

[23] Goodall B, 1987. *The Pengiun Dictionary of Human Geography*, London: Penguin

[24] Goodall B, 1987. *The Pengiun Dictionary of Human Geography*, London: Penguin

[25] Childe V G, 2008, pgs 3-19

[26] Childe V G, 2008, pgs 3-19

[27] Childe V G, 2008, pgs 3-19

[28] Childe V G, 2008, pgs 3-19

and generate new ideas),[29] and a wide labour market that allows for better skill matching between firms and individuals (leading to a concentration of skills and resources). The negative effects include poverty, characterised by deplorable living conditions, inadequate sanitation, air pollution, crime and other conditions that contribute to ill health and a fragile existence,[30] and environmental degradation, which impacts on the poor and can have serious national and global consequences, e.g. some African cities, such as Abuja, Lagos, Mogadishu, etc.[31]

In recent years, these types of cities have been boosted by information and communications technology (ICT), leading to an increase in the production, processing, exchanging and marketing of knowledge[32] to become focal points of the knowledge economy.[33] Some cities provide a good platform for the knowledge economy, as they host universities and other advanced educational institutions.[34] These cities have a high number of well-educated people[35] and provide opportunities for knowledge exchange and the development of talent.[36] Finland is a good example in this respect. It has been shown that Helsinki University was the main driver of economic growth during the second half of the 1990s.[37]

However, a factor of increasing importance for these cities is that of urbanisation. The growth of modern industry from the late 18th century has led to massive urbanisation that gave rise to new great cities.[38] Today, approximately half of the world's population lives in cities,[39] while the rate of urbanisation is increasing in developing countries in Africa, Asia and Latin America.[40] Urbanisation has raised a number of issues in African cities, and these issues relate to: employment (especially for the youth); urban planning; urban management; social

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[29] Childe V G, 2008, pgs 3-19

[30] OECD, 1997, (http://www.oecd.org/document/97/03343,html accessed on 04-10-2009)

[31] OECD, 1997, (http://www.oecd.org/document/97/03343,html accessed on 04-10-2009)

[32] Berg L and Winden W, 2004, pg 4

[33] Berg L and Winden W, 2004, pgs 4, 10

[34] Berg L and Winden W, 2004, pg 10

[35] Florida R, 2000, pg 15

[36] Berg L and Winden W, 2004, pg 10

[37] OECD, 2002, (http://www.oecd.org/document/02/03343,html accessed on 04-10-2009)

[38] Mayday 23, *World Population becomes more Urban than Rural*. News.ncsu.edu. http://www.news.ncs.edu/releases/2007/may/104.html. (accessed on 07-02-2009)

[39] Mayday 23, *World Population Becomes More Urban Than Rural*. News.ncsu.edu. http://www.news.ncs.edu/releases/2007/may/104.html. (accessed on 07-02-2009)

[40] Childe V G, 2008, pgs 3-19

services; education; transportation; energy; culture; infrastructure; food security; public participation (an integrated development plan [IDP]); violence; urban poverty; and pollution.[41]

Urbanisation has promoted the creation of urban diversity - an asset in urban regions. Urban diversity promotes creativity, where diversity is a measure of the degree of system openness.[42] The scale of cities and the diversity of their inhabitants create interactions that generate new ideas.[43]

Over the past 30 years, many African cities have developed urban development policies that were replicated from European urban development policies.[44] These included policies concerning infrastructure, housing, health and administrative organisation, which were based on European cities.[45] These policies are often expensive for their local governments to implement, resulting in the construction of unmanageable human settlements and the marginalisation of large sections of the urban population.[46]

Therefore, in today's world, it is widely accepted that cities are dynamic, non-linear (meaning that they cannot be understood by simply being decomposed into pieces that are examined first in isolation, and then together), and far from having equilibrium.[47] It is this new paradigm that embraces the reality of quantitative and qualitative changes over time and introduces inevitable uncertainty into the equation.

2.3 Challenges Faced by Cities

Cities are constantly evolving in a dynamic environment of growing complexity, with high uncertainty and a quickening pace of change. In an increasingly globalising, competitive and globalised world, cities now face extraordinary challenges related to such forces as economic restructuring and fiscal stress, national security, institutional relationships, changing roles of governance, environmental degradation, social and cultural transformation and rising exclusion.

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[41] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

[42] Berg L and Winden W, 2004, pg 11

[43] Berg L and Winden W, 2004, pg 11

[44] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

[45] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

[46] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

[47] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

A major part of the developed world's population currently lives in urban areas[48] with the rate of urbanisation rapidly increasing in developing countries. As a result, most cities are not able to offer a better life for their new citizens, leading to increases in urban poverty. According to the Organisation for Economic Co-operation and Development (OECD), urban poverty can be considered to be a multidimensional phenomenon:

> It includes limited access to employment opportunities and income; inadequate and insecure housing and services; violent and unhealthy environments; few or no social protection mechanisms; and limited access to adequate health and education opportunities. This poverty is generally marked by deplorable living conditions, inadequate sanitation, air pollution, crime, and many other conditions that contribute to ill health and fragile existence. Environmental degradation in cities has particularly severe impacts on poor urban residents, and there are also serious national and global consequences.[49]

In addition to urban poverty, another challenge that cities face is that of good or poor governance within the developed or developing countries of the globe. For example, as a developing country, South Africa does not have appropriate policy foundations, an economic base, or the managerial capacities to promote good governance.[50] Therefore, for South Africa, it is difficult to provide policies that can be beneficial for the trade, investments and financial flow that globalisation promotes. For example, potential investors, both national and foreign, assess the quality of life carefully, as well as the access to the critical infrastructure and services in a given city, before deciding whether to invest.

Research that the World Bank conducted suggests that South Africa faces the challenge of improving both the quality of management and governance of its cities.[51] Better management and governance may offer services that will attract foreign investments[52] and continue to serve the needs of their residents and their regional economies.

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[48] Oman C, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

[49] OECD, 1997, (http://www.oecd.org/document/97/03343,html accessed on 04-10-2009)

[50] This has been demonstrated by constant services delivery protests around the country.

[51] OECD, World Bank, 2006, (http://www.oecd.org/document/97/03343,html accessed on 04-10-2009)

[52] For example, Malls (Hemingways in East London and Plaza Mall in Mthatha) and Hotels (Savoy in Mthatha and ICC in East London)

2.4 The Comparison of Cities using World Bank Ratings

One way of comparing cities is to rate them using the "City Profiles Mechanism" that the World Bank has developed.[53] This mechanism distinguishes between two kinds of measures. Firstly, measures over which cities have full control and, secondly, measures over which cities have little or no control. The controllable measures include: transport and waste collection, social services, and security within the city.[54] Measures that cities can exercise little control over include: economic performance, the city's characteristics and equity.[55] Cities can apply these measures to establish their direction; for example, to be more innovative in a particular field or concept.

2.4.1 Measures over which Cities have More Control

(a) Quality of City Transportation and Waste Management Services

Cities of more globalised countries offer shorter commutes to work.[56] This could relate to lower urban densities, because the more dense the city, the greater the number of commuters, hence the longer the commute.[57] However, the workers' commute also depends on the city's size and structure, since urban sprawl affects the time involved and the types of transportation services available.[58] Where cities are more globalised,[59] they offer their residents more transportation choices, including private cars, buses, taxis (minibuses), trains, bicycles or on foot.[60]

In general, the less globalised cities[61] are highly dependent on bus transport and motorcycles. In the case of South African cities, they depend on taxis (minibuses) and illegal pick-up vans. This is because South Africa does not have a Bus Rapid Transit (BRT) system. It is possible that the low mean travel time to work in cities of more globalised countries results from the

[53] Leautier F A, World Bank, 2006, pg 71

[54] Leautier F A, World Bank, 2006, pg 71

[55] Leautier F A, World Bank, 2006, pg 71

[56] South African Cities have longer commutes to work due to town planning and design of Apartheid system

[57] This issue is referring to two major South African cities, i.e. Johannesburg and Cape Town

[58] Leautier F A, World Bank, 2006, pg 73

[59] More globalised cities are cities that are belonging in highly globalised countries according to Kearney Index.

[60] Leautier F A, World Bank, 2006, pg 73

[61] Less globalised cities are cities that belong in less globalised countries, according to Kearney Index

availability of a large variety of transportation (as mentioned above) that residents can utilise.[62]

Cities in more globalised countries produce more waste than those in less globalised countries, due to industrialisation.[63] However, cities in less globalised countries lack skills and resources for treating waste.[64] The methods of treating city waste in more globalised countries are significantly more advanced than in those less globalised.[65] Citizens care more about the fact that waste is collected in their neighbourhoods than how it is treated after being transported out of sight. Cities in more globalised countries use more incineration than in less globalised cities and rely less on open dumps than the less globalised cities.[66] The re-use of plastic, glass, paper and metal in cities of more globalised countries is very high. This obviously is due to the large number of employees in this sector in such countries.[67]

(b) Quality of City Social Services

More globalised cities have better outcomes in the provision of health and education services.[68] This may indicate that such cities have sufficient local political pressure to deal with local problems, such as health and education.[69]

(c) Crime and Security in the City

Indicators of security impact on a city's local economy and the perception of its quality of life.[70] More globalised cities tend to have a lower rate of murder, but have a greater incidence of theft than cities in less globalised countries.[71] This indicator of security may be differentiated by neighbourhoods.[72]

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[62] Leautier F A, World Bank, 2006, pg 73
[63] Leautier F A, World Bank, 2006, pg 74
[64] Leautier F A, World Bank, 2006, pg 74
[65] Leautier F A, World Bank, 2006, pg 74
[66] Leautier F A, World Bank, 2006, pg 74
[67] Leautier F A, World Bank, 2006, pg 74
[68] Leautier F A, World Bank, 2006, pg 75
[69] Leautier F A, World Bank, 2006, pg 75
[70] Leautier F A, World Bank, 2006, pg 75
[71] Leautier F A, World Bank, 2006, pg 75
[72] Leautier F A, World Bank, 2006, pg 75

2.4.2 Measures over which Cities have Little Control

(a) Economic Performance

Three indicators of growth and productivity are used to examine how local urban governments are rated on measures of economic performance. These include: a city's product in respect of currency per capita per year; the average per capita income (as a measure of wealth creation), and the ability to create jobs in the formal sector, as measured by the share of employment in the informal sector.[73] Empirical data show that a city's product per capita (CPL) is higher in more globalised cities.[74] Such cities are in position to provide more formal employment opportunities than their less globalised counterparts.[75]

(b) City Characteristics

Data suggest that cities located in more globalised countries seem to have a lower population growth or birth rate, and have a lower average household size.[76] This may indicate that living conditions in such cities are less stressed than their counterparts in less globalised countries.[77] This also indicates that the quality of life in such cities is higher,[78] compared to less globalised densely populated cities as they offer more space per person, and are less congested.[79] More globalised cities also have a high likelihood of being able to deliver better services, and have well-functioning local governments.[80]

(c) Equity

There are two indicators of equity. These include: households that fall below the poverty line (a measure of how well cities provide for their poorer residents), and income disparity (measured by the ratio of the fifth lowest income quintile to the highest quintile).[81] Cities in more globalised countries have approximately the same share of households living below the poverty line compared to cities in less globalised countries.[82] However, disparities in income

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[73] Leautier F A, World Bank, 2006, pg 71

[74] Leautier F A, World Bank, 2006, pg 72

[75] Leautier F A, World Bank, 2006, pg 72

[76] Leautier F A, World Bank, 2006, pg 72

[77] Leautier F A, World Bank, 2006, pg 72

[78] Leautier F A, World Bank, 2006, pg 72

[79] Leautier F A, World Bank, 2006, pg 71

[80] Results can be obtained by using city performance index scale

[81] Leautier F A, World Bank, 2006, pg 72

[82] Leautier F A, World Bank, 2006, pg 72

are considerably lower in cities in more globalised countries.[83] This may be interpreted as an indication that cities in more globalised countries are richer and therefore receive better instruments for dealing with inequalities than cities in less globalised countries.[84] Cities in less globalised countries may not be at a level where the benefits of globalisation can be used to reduce the number of poor people or to reduce income disparities.[85]

2.5 Scale of Measurement for City Performance

When companies or citizens choose a city in which to locate, they pay attention to issues, such as the quality of life, access to critical infrastructural and social services. Observing city performance profiles assistins in assessing the interdependence between the attained level of globalisation and the performance of the city, unless city managers are not responsive to signals from firms and citizens.[86] Such a case would occur if cities are badly governed or if there are few (or limited) levers or resources that city managers can use.

There are two scales that A. T. Kearney developed while using foreign policies.[87] These scales are indexes of globalisation and city performance.[88] The index of globalisation calculates and assesses changes in the components of globalisation by measuring the political engagement missions of member countries of an international organisation – the United Nations Security Council (UNSC) - in which each country, as well as foreign embassies that each country hosts, participates.[89] This scale (index of globalisation) also measures the use of technology, where they examine the number of internet users, hosts and secure servers within a particular city in a certain country.[90] It also takes note of personal travelling, such as international travel, tourism and cross-border transfers.[91] Finally, it notes the economic integration, e.g. trading, foreign direct investments and portfolio capital flows, income payments, and the city's revenues.[92]

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[83] Leautier F A, World Bank, 2006, pg 73

[84] Leautier F A, World Bank, 2006, pg 72

[85] Leautier F A, World Bank, 2006, pg 73

[86] For example the South African cities; almost all are badly governed

[87] Leautier F A, World Bank, 2006, pg 70

[88] Leautier F A, World Bank, 2006, pg 70

[89] Leautier F A, World Bank, 2006, pg 70

[90] Leautier F A, World Bank, 2006, pg 70

[91] Leautier F A, World Bank, 2006, pg 70

[92] Leautier F A, World Bank, 2006, pg 70

The second scale of measurement is a city's performance, where seven key factors[93] are taken into account:

- Economic performance, as measured by city product per capita, average per capita income, and the share of informal employment.
- City characteristics, as measured by residential density, population growth rates, and the average household size.
- The equity in the cities, as measured by the share of households below the poverty line and by income disparity.
- How the city performs with respect to infrastructure services, as measured by city transportation services and waste management.
- The capacity to provide health and education services, as indicated by the mortality rates for children younger than five years old, the number of hospital beds per capita, and the number of children per primary and secondary classroom.
- The performance of local governments within the city, as measured by local government revenue and expenditures per capita, and wages in the local government budget.
- Finally, the urban crime, as measured by theft and murder rates at city levels, which are indicators of security.

It has been hypothesised that cities of more globalised countries should be more efficient to provide a better quality of life, as they respond to competitive global business pressures.[94] Firms and individuals choose to locate to a city that is sensitive to indicators, such as higher quality of life, access to critical infrastructure and social services, as well as security. One expects to see that these indicator levels are higher in more globalised cities. However, it is not clear how cities of more globalised countries will fare when they respond to their local citizens' pressures for health and education services, which are more local by nature.[95] These services depend on the quality of local institutions, and a large variance across city

[93] Leautier F A, World Bank, 2006, pg 71

[94] Leautier F A, World Bank, 2006, pg 71

[95] Leautier F A, World Bank, 2006, pg 71

performance profiles in cities at the same level of globalisation can be expected, if this hypothesis holds.[96]

2.6 The Changing Nature of Cities in the 21st Century

Castells regards the information technology revolution as a change agent for the economy and society.[97] He also regards global cities as command and control centres that are able to co-ordinate, innovate and manage the intertwined activities of networks of organisations within them.[98] This forces the cities to change their nature of operations to respond to the knowledge economy. For example, the three following cities, London, Singapore and Honolulu, have been used to illustrate these cities' changing natures towards the 21st century.

London is the world's most important financial centre and is the engine of the British economy.[99] Its financial sector is highly ICT-enabled.[100] The City of London has the advantage of doing financial transactions with other countries in the world by using ICT. But, London's public services, with regard to transport, security, accidents and emergency services and secondary education have been deteriorating over the past decades. Now, they are worse than elsewhere in England and Wales.[101] This decline was caused by an inadequate city-wide budget and lack of control of its own city budget, as the national government distributes city taxes to other United Kingdom (UK) cities.[102] This has caused problems on balancing economic prowess against the quality of life. Therefore, London has become an ideal city of the information age, but not ideal in terms of providing a quality of life. It is a city that has succeeded in attracting high value global financial capitalists to its shores, largely based on the quality of services it could offer.[103]

Singapore is a city-state in the Asia Pacific Economic Co-operation grouping (APEC). From the mid-1980s to the present day, Singapore has made sizeable investments in putting ICTs in

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[96] Leautier F A, World Bank, 2006, pg 71

[97] Abrahams Luci, 2003, pg 3

[98] Castells M, 2000. *The Information Age*, Blackwell, 2nd Edition 2000, pg 409

[99] *The Economist*, London The best and worst of places. Junuary 2003, pgs 11-17

[100] The economic growth of London has been based on innovation and internal transformation within the traditional economies and new economic sector, such as ICT

[101] Abrahams Luci, 2003, pg 3

[102] Abrahams Luci, 2003, pg 3

[103] Abrahams Luci, 2003, pg 3

place to work for its financial, business, service and government sectors.[104] It is situated at a strategic point in the Asia-Pacific region and has attempted to strengthen its position as a regional hub or centre for regional trade and services using ICTs, relevant knowledge and skills.[105]

For example, the Singapore harbour was redesigned in the 1980s.[106] The institution of the Singapore port of authority has improved the unloading and loading of all ships that dock at its harbour.[107] This change was made by ICT applications and innovations in process management. This caused Asia's economic strength to be measured in tons, most of which passes through the port of Singapore.[108] The Maritime Port Authority (MPA) of Singapore handles 800 ships and 30 000 to 40 000 containers per day - about 1 million per month.[109] In 2002, the MPA handled more than 10 000 ships and more than 1.2 million containers per month, using computers to track and trace containers.[110]

Employment statistics reflect some changes in occupation from 1980 to 1989.[111] There were 38.8+% professionals and scientists and 48+% services.[112] This demonstrates a shift away from manufacturing to a knowledge-based economy. The knowledge-based economy (KBE) for all is one of five sub-themes of APEC. KBE became the foundation of economic growth in the APEC region.[113] Immediately, Thailand called for APEC to redouble implementation of its KBE strategy in support of the knowledge-based economy, to maximise the command of the combined potential of information and communications technology, human resource development and conducive legal and regulatory framework.[114]

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[104] Abrahams Luci, 2003, pg 3

[105] Abrahams Luci, 2003, pg 3

[106] Abrahams Luci, 2003, pg 3

[107] Abrahams Luci, 2003, pg 3

[108] Mintier T, 1995, "*Computers keep Singapore's economy afloat,"* web posted on CNN Technology, www.cnn.com October 11 1995, (accessed on 06-06-2009)

[109] Abrahams Luci, 2003, pg 3

[110] Maritime Port Authority (MPA), port statistics, www.mpa.gov.sg (accessed on 15-03-2009)

[111] Maritime Port Authority (MPA), port statistics, www.mpa.gov.sg (accessed on 15-03-2009)

[112] Yue-man Yueng and Fu-chen Lo, 1996. *Emerging World Cities in Pacific Asia*, produced in association with the Chinese University of Hong Kong, United Nations University Press Tokyo-New York-Paris, www.unu.edu/unupress/unupbooks/uu11ee/uu11ee00.htm (accessed on 22-07-2009)

[113] Abrahams Luci, 2003, pg 4

[114] Abrahams Luci, 2003, pg 4

The third city is Honolulu, the capital of Hawaii. In 2002, this city hosted the OECD-APEC global forum on knowledge economy (digital economy). At the opening of the meeting, the city mayor informed delegates that Honolulu and Hawaii were strategically placed as they could do business together,[115] and that they also are suitable destinations for conferences and business activity because of their proximity, making it easy to reach their destination.[116] There are a number of additional factors that shape Honolulu's current and future economic performance.[117] For example, the revolution of entrepreneurial start-ups, technological incentives, venture capital investments, business incubators, and private labour unions' development initiatives demonstrate a shared sense of urgency. This causes Hawaii to focus on its competitive strength in an effort to diversify the economy.[118] Hawaii is a country with a troubled economy, because of the low prospect of growth potential from the decades' old tourist industry. Local business analysts and decision-makers are therefore deliberating, planning and acting to determine future growth plans in the context of a knowledge-based economy.

The actual and potential impact of ICT on the growth and development of the above-mentioned cities have become a priority. This proves that, to ensure their survival, these cities could be innovative by strengthening their ICT and entrepreneurship. Although London, Singapore and Honolulu are not at 100% as regards balancing their economic prowess against the quality of life within,[119] they are innovative in respect of other aspects, for example the use of ICT.

ICT and knowledge-building played a major role in each of the cities' network thematic focus areas {socio-economic development, urban policy, human immunodeficiency virus/acquired immune deficiency syndrome [HIV/AIDS], urban indicators and transport}. That is why it is imperative for cities to be innovative in the knowledge economy era. The socio-economic development focus could address issues of ICT-enabled manufacturing growth and new or emerging skills that are required for future industrial developments, while the urban policy and HIV/AIDS-focused areas could address issues of social inclusion.[120] In designing,

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[115] Abrahams Luci, 2003, pg 4

[116] Abrahams Luci, 2003, pg 4

[117] Abrahams Luci, 2003, pg 4

[118] Fitzgerald M, 2002, "*Creating our Economic Future is up to us*", President and OECD of Honolulu, 23 May 2002. www.enterprisehonolulu.com

[119] This is according to the scale of the global index and city performance.

[120] Abrahams Luci, 2003, pg 5

preparing and publishing urban indicators with relevant data, this can provide useful profiles on the growth of the human capital, technology and ICT dimensions of South African cities, government and private sector decision-makers. This information will also assist international investors who are interested in locating to, or investing in, South Africa.[121]

What has been illustrated above shows that size cannot be the key factor to determine the economic growth, i.e. the annual gross domestic production (GDP) contribution of a city. Instead, innovation is a determining factor as regards the city's economic growth. Take the example of Singapore, where innovation determines its growth in the economic sectors of construction, manufacturing, and transport. It also includes the communications (ICT), business and financial sectors - in particular regional and international business and financial services.

2.7 The Status of South African Cities

The traditional town-planning approach and apartheid regulations guided the establishment of South African cities. These cities and towns were intended only for the white minority. The planners did not foresee the day when all races in South Africa would be free to move from rural areas to townships and cities, and vice versa.

Potter and Lloyd-Evans refer to South African cities as "apartheid cities",[122] because of their most extreme forms of social segregation and economic division. These regulated apartheid cities led to what Potter and Lloyd-Evans call separate development, where the forced removal of the black population from cities to townships that were located on the periphery.[123]

In South Africa, the post-1994 democratic process enabled a mass urbanisation of South Africans from rural areas to cities. According to Cross and Harwin, the urbanisation was driven by the need to search for work and better living conditions.[124] Many immigrants also came from other countries to South African cities.[125] The mass migration to cities has led to high rates of unemployment, poverty, traffic congestion and rising crime. It has been observed that the impact of unemployment must be understood in the context of migration.

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[121] Abrahams Luci, 2003, pg 5

[122] Potter and Llyod-Evans, 1998, pg 124

[123] Potter and Llyod-Evans, 1998, pg 124

[124] Cross and Harwin, 2000, pg 7

[125] This refers to the people from SADC countries, Central, East, West and North African States

With migration, individuals respond to changing economic conditions which, in the case of South Africa, has led to a decline in employment opportunities within the cities.

South African cities are constantly evolving in a dynamic environment of growing complexity. This is also caused by the political landscape that has heightened uncertainty, as well as a quickening pace of change.

South African cities are facing extraordinary challenges related to forces, such as economic restructuring and fiscal stress, security, the changing roles of governance, environmental degradation, social and cultural transformations.[126]

To illustrate this, an example of Mthatha in the Eastern Cape Province will be presented:

Mthatha was the capital city of the former Transkei "homeland". But, after 1994, it lost its capital status.[127] Before 1994,[128] the city was highly politicised and tense with many boycotts, which crippled the local government and surrounding municipalities within the homeland of Transkei. This resulted in a severe economic downturn with the withdrawal of both public and private sector investments and massive job losses.

However, during the past five years, there have been signs of improvement. Investors have built new malls (the Plaza and Savoy Malls) and hotels (Savoy Hotel, etc.). The up-grading of the N2 highway between East London and Mthatha and promised reconstruction of the Kei Rail have also boosted investors' confidence. In recent economic data, there are signs that the performance of certain sectors is improving. This includes employment growth in the community and social and personal services. There also are massive wholesalers and retailers, construction, finance and insurance companies, real estates and transportation that contribute towards the improvement of the local economy. This presents the city managers with the challenge to understand the layers of the local economy within the city of Mthatha.

On the other hand, there is widespread institutional failure, evidenced in the collapse of the bulk of the sanitation system.[129] The pollution of the Mthatha River is caused by a direct sewer run-off and high accumulation of solid waste. Pot-holed roads and the illegal pick-up taxis that transport passengers to the surrounding rural villages are a nightmare. On the pavements, competition is rife between delivery vehicles, taxis, hawkers and pedestrians. The

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[126] Sirayi Mzo, 2008, pg 340

[127] When the democratically elected government took over the reigns in the Republic of South Africa

[128] The time the Transkei "Homeland" was governed by military government led by General B. Holomisa

[129] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

police are also tardy to respond, even to emergencies. Many local business people, who are willing to pay the required bribe to win small government contracts, nevertheless are cynical about government promises.

There are severe infrastructure constraints. The bulk network was developed to accommodate the colonial Mthatha city 34 years ago. Currently, the city cannot meet the current population's demands. This causes serious challenges to the infrastructure. For example, it was found that 19 of 20 pump stations were dysfunctional, with raw sewage flowing unchecked into the river.[130] There is also a decline in waste management, with piles of debris everywhere. This compromises the health and safety of communities.

The structure of the economy perpetuates a racial and class divide. The few large firms that dominate all sectors are mainly White and Indian owned and tend to monopolise the market. Interestingly, the middle layer of the economy - that of foreign-owned businesses[131] - is emerging between the large firms and the formal black-owned local firms.[132] They appear to be able to afford the high rentals within Mthatha's central business district (CBD) and occupy formal business space. Part of their success is ascribed to networking and co-operation. For example, three separate owners trade with cell phones, radios and clothing, with the businesses operating from a single space. Foreigners have also focused successfully on providing variety in the market. They offer a wide range of accessories required for traditional initiation, graduation, engagement and marriage ceremonies.[133]

Below the foreign-owned business layer, there is another layer of the economy that consists of hundreds of semi-formal businesses.[134] Their main activities have relatively low barriers for entry, such as construction and public transport. Due to the large number of constructors, their profit margins are squeezed and this has resulted in the firms in the construction sector to admit openly to corruption being the only competitive factor at this end of the market. This promotes "tenderpreneurship" - a fatal blow to entrepreneurship. The client base of small contractors is the government, i.e. almost 95%.[135]

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[130] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[131] Foreigners (from Central Africa-Ghana and Pakistan) are trading on selling cellphone, saloons, etc.

[132] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[133] These stores are to be found around the Grosvenor area which is part of the central business district (CBD) of the city

[134] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[135] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

Below the semi-formal layer, there is another layer that consists of small firms described as "the vast informal sector". This layer consists of approximately 3000 hawkers who struggle for survival.[136] Of these, approximately 98% are Africans (South African citizens and other African nationals, e.g. people from Zimbabwe, DRC Congo, Nigeria, Ghana, etc.), and females comprise about 86%.[137] More than half (± 63%) purchase and sell fruit and vegetables.[138] Others (± 14%) make clothing and some (± 12%) do hair dressing.[139] However, very few jobs are created in this sector. The ratio is approximately 0.5 workers per firm.[140] Approximately 70% operate on the pavement and at taxi ranks.[141] This informal sector appears to be in a poverty trap, where 53% of the hawkers have been operating for more than five years, and 61% earn less than R500 per month.[142]

This structure of the local economy encourages massive leakages from the city. Large wholesalers and retailers source most of their supplies from East London, Durban and Johannesburg. Their head offices are located mainly in Johannesburg, Gauteng. The residents of Mthatha and its surroundings are their market. The small, medium and micro enterprises (SMMEs) purchase goods from wholesalers and retailers within Mthatha or in East London and Durban, but have very little bargaining power with the large firms.[143] The dependency relationship between the large and small firms means that the number of times money circulates within the local economy before it leaves Mthatha is greatly reduced. A negligible manufacturing activity exists, as firms cannot buy from local producers. A shift that is needed is for residents to move from being primarily consumers to producers.

It is clear that the economic status quo is undesirable and unsustainable. Meanwhile, there are opportunities in retail, real estate, transport and financial industries if the key obstacles can be removed. But, economic growth alone cannot make the city sustainable. The current economic trends offer no incentives for either government or business to focus on a quality of services or production.

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[136] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[137] Harrison K, 2009, (accesed on www.citythinkspace.com, 10-03-2010)

[138] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[139] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[140] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[141] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[142] "Many traders are earning as little as R500 a month", taken from a random interview with an anonymous person.

[143] A comment from one hawker was that "they entice us with credit, and then we end up as dummies"

Mthatha is not a basket case. The city has a number of strong comparative advantages that could sustain long-term development in the city. It strongly needs to be innovative to promote pragmatic and sustainable long-term development. Innovative aspects, such as urban hubs, local links, cultural planning and a triple helix will be of massive assistance to the city. Advantages include the central market of 1.5 million people.[144] There is the magnificent Mthatha River that could be rejuvenated as a major transport linkage between the city, other urban centres and the rural hinterland. The city of Mthatha can capitalise on its people with their local knowledge, aspirations and skills being an advantage towards innovation. Mthatha has fertile soil and an excellent climate that can be utilised or that can play a major role to bring economic sustainability to its urban residents. There are linkages between the city, the major tourist attractions along the coastline, and the population's spending power. Mthatha also has competitive advantages in the form of the Nelson Mandela Museum and the Walter Sisulu University (formerly known as the University of Transkei) that need to be harnessed immediately to change the economic trajectory of the region.

The second example to illustrate the status of South African cities is that of the East London city (also known as Buffalo City) which will be described as follows:

The city of East London is crumbling; it urgently needs regeneration regarding improvements of its economy. The local government officials and politicians recognise the decline of employment opportunities, increasing urban poverty, the deplorable state of the quality of life, the lack of critical infrastructure, high rates of HIV/AIDS reported cases, and poor social services.[145] With regard to urban poverty, about 71% of the municipal population earns less than the household subsistence level of R1500 per month.[146] In the 11th annual survey, Eastern Cape statistics show that 20.2% of pregnant women in the province were HIV positive.[147] The largest percentage (32.4%) was in the age group 20 to 24 years.[148] In the geographical area in which Buffalo City falls, 16% of pregnant women were found to be HIV-positive.[149]

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[144] Harrison K, 2009, (accessed on www.citythinkspace.com, 10-03-2010)

[145] Khuthala Nandipha, 2010. Buffalo City Newsletter, (date: 02-02-2010)

[146] Khuthala Nandipha, 2010. Buffalo City Newsletter, (date: 02-02-2010)

[147] Khuthala Nandipha, 2010. Buffalo City Newsletter, (date: 02-02-2010).

[148] Khuthala Naphinda, 2010. Buffalo City Newsletter, (date: 02-02-2010)

[149] Khuthala Naphinda, 2010. Buffalo City Newsletter, (date: 02-02-2010).

This proves that East London is facing a formidable list of priorities competing for attention. Accelerated economic development is vital to increase jobs and incomes in a more competitive international environment. Substantial investment in social infrastructure and services is needed to meet basic needs and to reduce historic inequalities. Improved housing, on a large scale, is required (Tokyo Sexwale[150] started at Buffalo City to demolish the poorly built houses) to address dire living conditions and continuing urbanisation.

Congestion in the transport system demands urgent investment. Fragmented, local administration needs rationalisation and more effective management systems. This crowded agenda and pressure for short-term delivery threaten to overshadow the need to reshape and integrate the city. Spatial integration has proved more complex and controversial than anticipated in the mid-1990s. Despite widespread agreement on the need for change, consistent policies and programmes have not been developed or implemented. Meanwhile, a new spatial economic dynamic affects Buffalo City-East London, following a steady relaxation of earlier physical controls. In the absence of a coherent urban policy, these forces seem to produce increasingly unequal and dysfunctional outcomes.

In 2004, the city council assembled the relevant players, such as the private sector, local community groups, non-governmental organisations, civic organisations, and trade unions, under the broad strategy of Buffalo City Development Agency (BCDA). This agency has a special purpose based on a successful international model. These efforts are ring-fenced within a focused entity.

Although mindful of the pressure to show bricks and mortar as measurable indicators of success, the BCDA has been gathering momentum. More importantly, it believes that its development mandate must inform every decision that it takes. The BCDA's mandate was based, not only on the disposl of sites,[151] but also on delivering sustainable development. Consequently, it painstakingly applies time-consuming, but necessary, processes that ultimately will ensure that it achieves its mandate to improve the quality of life for all its citizens.

This agency (BCDA) has failed to improve the quality of life within the city. Instead, it brings, or will increase, the urban poverty in the long run, as BCDA is giving or selling the

[150] Tokyo Sexwale is a minister of Human Settlement in South Africa, started 2009

[151] To confirm this further, the Minister of Rural Development and Land Redistribution of the Republic of South Africa mentioned that 80% of the land belongs to foreigners. (He said this on 24-03-2010 in Parliament, Cape Town)

land (property) to the foreigners.[152] This means that the city's residents and the city itself will have nothing in which to invest, which might cripple the city's sustainability. City managers need to think out of the box, as regards certain innovative aspects, to save the city and its residents from urban poverty. The city managers also need to provide a better quality of life, sustainable infrastructure and development, and social services to the city's residents.

2.8 The Notion of the Knowledge Economy

Knowledge economy is an economic configuration, whereby knowledge has been valued as a key factor in production and also an important source for radical innovation.[153] To describe the knowledge economy, we must first define the following terms: economy, economic problems, knowledge and knowledge economy. It is important to examine economic history, to analyse why and how the economy exists within the human society.

It is also important to describe the emerging knowledge economy and describe what is new about the emerging knowledge economy. Furthermore, how can cities meet the challenges and characteristics of the knowledge economy in the 21st century?

2.8.1 Economic History

Economics is the study of the process of providing for the material well-being of society; in short, economics is the study of how humankind secures its daily bread. Economy is the relationship between production and distribution. Economic problems arise because the needs of different societies exceed the gifts of nature.[154] This gives rise to the general conditions of scarcity.

Once again, some background is important of why, and how, the economy came into being, before describing the knowledge economy. During medieval times, economic problems gave rise to the market society.[155]

Since the economic problems have given rise to a market society, production and distribution has engendered a vast exchange between the buyers and sellers. Many societies had markets,

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[152] To confirm this further, Minister of Rural Development and Land Redistribution of Republic of South Africa, mentioned that 80% of the land belongs to foreigners. (He said this on 24-03-2010 in Parliament, Cape Town)

[153] Yeo B J K, 2010, pg 71

[154] Heilbroner and Milberg, 2001, pg 12

[155] Heilbroner and Milberg, 2001, pg 22

but these markets did not organise the fundamental activities of those societies.[156] During the Middle Ages, tradition, changelessness and order were the key concepts. The first evidence of a truly modern market society was beginning to manifest in the medieval cities of Italy and Holland.[157] The archaic forms of feudal relationship still persisted in the agricultural sectors of these nations and in the city life of other nations in Europe.[158] This evidence led to the ten forces of change that resulted in the emergence of the market society,[159] they were: itinerant merchants, urbanisation, the crusades, the growth of national power, exploration, the changes in the religious climate, Calvinism, the Protestant ethic, the breakdown of the manorial system. and the rise of the cash economy.[160] These forces of change were operative within European feudalism and they gradually served to introduce the structure of a market society. Heilbroner and Milberg summarise these forces as follows:

> The role of the *itinerant merchant* in introducing the trade, money, and the acquisitive spirit into feudal life. The *process of urbanisation* as a source of economic activity and as the locus of a new, trade-centred seat of power. *The crusades* as a force for the disruption of feudal life and the introduction of new ideas. The rise of unifying, commerce-supporting *national states*. The stimulus of the *Age of Exploration* and of the *gold* it brought into Europe. The emergence of *new religious ideas* more sympathetic to business activity than Catholicism had been. The *monetisation of dues* has been within the manorial system.[161]

In economic history, scholars concentrate on two main currents of economic activity, i.e. agriculture and commerce. However, from the earliest days, there was a third essential source of economic wealth called "industry".[162] The industrial revolution was a great turning point period in history. Since that time, manufacturing and industrial activity became primary forms of social and economic production,[163] which began in 1750 (the late 18th century) in England. The industrial revolution brought some changes within the society. It ushered in a slow but cumulative rise in output that was eventually to lift the industrial world out of age-

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[156] Heilbroner and Milberg, 2001, pg 22

[157] Heilbroner and Milberg, 2001, pg 36

[158] Heilbroner and Milberg, 2001, pg 36

[159] Heilbroner and Milberg, 2001, pg 36

[160] Heilbroner and Milberg, 2001, pg 36

[161] Heilbroner and Milberg, 2001, pg 56

[162] Heilbroner and Milberg, 2001, pg 59

[163] Heilbroner and Milberg, 2001, pg 59

old poverty. It also brought the factory as a new environment for work and life,[164] which gave rise to new kinds of social abuses, but it also greatly sharpened the general awareness of economic conditions. At the same time, the industrial revolution brought successive waves of technical progress and economic advance and caused a vast increase in urbanisation. People started to experience the cumulative rise of economic interdependence of individual persons within society.

2.8.2 What is new about the New Economy?

The new economy (the knowledge economy) is knowledge intensive, as compared to the traditional economy, based on capital and labour. Information became freely available and less expensive in internet search engines, like Google, yahoo, etc. For example, machines replaced labour during the era of the industrial revolution[165] and continued until the Information Age. Information technology is the locus of codified knowledge in the knowledge economy. The revolution of information technology intensified the move towards knowledge codification. Knowledge became codified and transmitted worldwide at little cost. The access to information became easier and less expensive. The skills and competencies related to the selected and efficient use of information became more crucial. Tacit knowledge is needed to handle the codified knowledge in the form of skills. Work in the knowledge economy demands human skills (tacit knowledge), such as conceptual, experiential knowledge, interpersonal management and communication skills. One can think of the function of knowledge economy production in which knowledge is the only factor, with codified knowledge replacing capital (equipment) and tacit knowledge replacing labour (knowledge work) but, unlike capital and labour, codified knowledge and tacit knowledge are non-substitutable.

The knowledge economy relies mostly on the diffusion of knowledge, use of knowledge and creation of new knowledge. The successes of cities, municipalities, enterprises, etc. depend on their effectiveness in gathering, absorbing and utilising knowledge, and on the creation of new knowledge. Knowledge economy is accelerated by the rate of change and the rate of learning. This means that cities must become learning organisations, continuously adapting management, organisation and skills to accommodate new technologies. Cities must

[164] Heilbroner and Milberg, 2001, pg 59

[165] Heilbroner and Milberg, 2001, pg 59

increasingly join the networks, where interactive learning involves creators, producers, users in experimentation, and where exchange of information drives innovation.

In the knowledge economy, cities search for linkages to promote the inter-firm interactive learning. These relationships (linkages) assist cities to spread the costs and risks that are associated with innovation. Thus, innovation is the result of numerous interactions between actors and institutions that, together, form an innovation system, which consists of the flows and relationships that exist among industry, government and academia. The development of science and technology, and the interactions within these systems, influence the innovate performance of the cities.

The emergence of the knowledge economy can be characterised in terms of the increasing role of knowledge as a factor of production.[166] It impacts on skills, learning, organisation and innovation. Knowledge economy leads to an enormous increase in the codification of knowledge. It also brings about networks and the digitalisation of information. Increasing codification of knowledge leads to shortages of tacit knowledge because of a shift in the balance of the stock of knowledge.[167] This codification also promotes a shift in the organisation and structure of production. Information and communication technologies (ICT) increasingly favour the diffusion of information over re-invention.[168] In consumption, knowledge is not necessarily exhausted. Codification produces a convergence, and bridges different areas of competence. It also reduces the knowledge dispersion and increases the speed of turnover of the stock of knowledge.[169] The innovation system and its knowledge distribution power are critically important. The increased rate of codification and collection of information lead to a shift in focus towards tacit skills.[170] Learning is increasingly central for both people and organisations. Learning organisations are increasingly becoming networked organisations, since initiative, creativeness, problem solving and openness to change are becoming more and more important skills with networked organisations.[171] The transition to a knowledge-based system may make failure systemic. A knowledge-based

[166] Houghton John and Peter Sheehan, 2000, pg 2

[167] Houghton John and Peter Sheehan, 2000, pg 1

[168] Houghton John and Peter Sheehan, 2000, pg 10

[169] Houghton John and Peter Sheehan, 2000, pg 10

[170] Houghton John and Peter Sheehan, 2000, pg 11

[171] Houghton John and Peter Sheehan, 2000, pg 11

economy is so fundamentally different from the resource-based system of the last century that conventional economic understanding must be re-examined.[172]

In the knowledge economy, there are new ground rules. Knowledge has fundamentally different characteristics from ordinary commodities. These differences have crucial implications for the way knowledge economy must be organised. The whole nature of economic activity and our understanding is changing. Ideas and information exhibit very different characteristics from the goods and services of the industrial economy. In the case of innovation, ideas and information become contrary to the industrial economy, which would seem largely to be the case. While up-front development costs can be very high, the cost of reproduction and transmission of information and ideas is low.

Traditional economics is founded on a system that seeks to optimise the efficient allocation of scarce resources. But, because of the unique characteristics of information and knowledge, the very meaning of scarcity is changing. Indeed, scarcity that defies expansiveness of knowledge is the root of one of its most important defining features. Once knowledge is discovered and made public, there is, essentially, zero marginal cost to adding more users.

Knowledge does not wear out. People can duplicate it practically without cost. It is a source of super-value and super-productivity. Knowledge can increase value without diminishing it somewhere else. Ideas and innovations have extensive externalities. Their benefits typically extend well beyond those who first put them forward, and it can be difficult to exclude other potential users of knowledge through intellectual property rights.

One disturbing feature of the emerging knowledge economy is the increasing evidence that the world's nations are polarising, rather than converging, in economic terms. For example, in South Africa, there is a gap between wealth and poverty. Countries appear to be moving two peaks or nodes, one at high incomes, and the other at relatively low incomes. This polarisation of countries into different strata of economic activity and of living standards is becoming both pronounced and persistent.

These dynamics may cause changes in the industrial structure of knowledge economics. Many contend that increasing inequality can be observed at international, national, regional, household and personal levels; that the rich are getting richer, while the poor are getting poorer.

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[172] Houghton John and Peter Sheehan, 2000, pg 12

Some economists suggest that increasing returns from network economies and learning economies, characteristic of knowledge economies, will lead to industrial concentration, where the winner takes all. Others contend that the expansion of the knowledge-driven economy will create a proliferation of material, cities and activities at all points and at all levels, suggesting that no one can expect to enjoy the continued control of markets.

That the knowledge economy is experiencing the development of new business models proves to be true.

2.9 What are the Characteristics of the Knowledge Economy in Cities?

It is easy to define or state what kind of cities are successful, or can be successful in the knowledge economy.[173] This is because of the definition of knowledge economy, where knowledge has been used as a key factor in production.

Knowledge is quite distinct from data and information, although these three terms are sometimes used interchangeably. "Data comprises of facts, observations, or perceptions (which may or may not be correct). Alone data represents raw numbers or assertions, and may therefore be devoid of context, meaning or intent."[174] "Information is a subset of data, where data possesses context, relevance and purpose."[175] Information involves the manipulation of raw data to obtain a more meaningful indication of trends or patterns in the data.[176] Nonaka and Takeuchi regard knowledge as defined in the area as justified beliefs about relationships among concepts relevant to that particular area.[177]

> Knowledge consists of truths and beliefs, perspectives and concepts, judgements and expectations, methodologies and know-how, and is possessed by humans, agents or other active entities. It is used to receive information to recognise and identify; analyse, interpret and evaluate; synthesise and decide; plan, implement, monitor and adapt - i.e. to act more or less intelligently. In short knowledge is used to determine what a specific situation means and how to handle it.[178]

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[173] Berg L and Winden W, 2004, pg 8

[174] Irma Becerra-Fernandez, Avelino Gonzalez and Rajiv Sabherwal, 2004, pg 12

[175] Irma Becerra-Fernandez, Avelino Gonzalez and Rajiv Sabherwal, 2004, pg 13

[176] Information is considered as data in context, for example a telephone book

[177] Wiig K, 1999, pgs 3-2

[178] Irma Becerra-Fernandez, Avelino Gonzalez and Rajiv Sabherwal, 2004, pgs 15-16

Therefore, knowledge results in action.

Knowledge economy refers to the economic configuration that emerges from the existing traditional economy, based on capital and labour. This emergence has been assisted by two defining forces, which are the rise in knowledge intensity by diffusion in economic activities, and the increase in the globalisation of economic affairs.[179] This means that the emerging of knowledge economy can be characterised in terms of increasing the role of knowledge as a factor of production. It also impacts on learning, skills, organisation and innovation. Past centuries have witnessed several fundamental economic transformations.[180] Each of these economic transformations has had fundamental implications for the nature of society.[181] For example, the industrial revolution laid the foundation of the economy's evolution from agriculture to industry.[182] It not only increased the standard of living, but also the location of life was changed from rural communities to metropolitan megalopolises.[183] The scientific revolution of the past century has resulted in the systematisation of change itself.[184]

2.9.1 Globalisation

Globalisation is the main driver of the emerging knowledge economy. There are three great eras of globalisation, i.e. globalisation 1.0, globalisation 2.0, and globalisation 3.0.[185] Globalisation 1.0 lasted from about 1492, when Columbus set sail, opening trade between the old and the new world, until about 1800.[186] In this era, countries and governments were often inspired by religion, imperialism, or both. For countries to survive, they had to have muscular strength – horsepower, and later, steam power.[187]

The second era of globalisation, i.e. globalisation 2.0, lasted from about 1800 to 2000. However, the First World War, the Second World War and the Great Depression interrupted this era, in which the countries had multinational companies that went global for markets and labour. They were spearheaded first by the expansion of the Dutch and English joint-trade

[179] Houghton John and Peter Sheehan, 2000, pg 2
[180] Stiglitz E Joseph, 1999, pg 1
[181] Stiglitz E Joseph, 1999, pg 1
[182] Heilbroner and Milberg, 2001, pg 59
[183] Stiglitz E Joseph, 1999, pg 1
[184] Stiglitz E Joseph, 1999, pg 1
[185] Friedman T, 2006, pgs 9,10,11
[186] Friedman T, 2006, pgs 9,10,11
[187] Friedman T, 2006, pg 205

companies and the Industrial Revolution. In the first half of this era, transportation costs impacted on global integration. The new developments of the steam engine and railroads also contributed to globalisation. Communication costs impacted on the second half of the era. The diffusion of the telegraph, telephone, personal computers (PCs), satellites, fibre optic cable, and the early version of the World Wide Web also assisted this phase of globalisation. This era really saw the maturation of a global economy.[188]

The last era, globalisation 3.0, took off in about 2000, which was where we entered into a whole new era. The world had gone from round to flat.[189] A Flat World is the product of the convergence of the PC, which has allowed everybody to have access to the digital content around the world.[190] This convergence was caused by the information technology revolution.[191] It just happened around the year 2000, and no one anticipated it. In this era, information flows seamlessly and contributes to intensify knowledge.

It can be argued that the diffusion of information and knowledge has increased dramatically due to globalisation and the new ICT. The new knowledge, or innovation, that formerly took years or months to spread, is now globally available in seconds.[192] This process speeds up new knowledge creation. This has caused the crucial ability to select and interpret new information and knowledge, and to turn it into profitable activities.

The knowledge economy is a network economy. The increase in availability of knowledge and information makes it impossible for individuals or a single company to master all the disciplines, and also make it difficult to monitor the latest developments. This results in an engagement in strategic networks to be crucial. Networks enable organisations to respond faster in rapidly changing markets and technologies. This becomes conducive to creativity producing new combinations. Therefore, every city in the knowledge networks must develop its own specialisation.

2.9.2 The Rise of Knowledge Intensity

The rise of knowledge intensity has being driven by the information technological revolution. The past 20 years have seen an explosion in the application of computing and communication

[188] Friedman T, 2006, pg 10

[189] Friedman T, 2006, pg 11

[190] Friedman T, 2006, pg 204

[191] Friedman T, 2006, pg 205

[192] Berg L and Winden W, 2004, pg 9

technologies.[193] All areas of business and community life were in a position to experience this revolution. In the internet, these technologies converged.[194] The phenomenon of the internet exemplifies the information revolution.[195] For example, during the first decade of its development, the internet remained a specialist research network.[196] By 1989, there were 159 000 internet hosts worldwide and, ten years later, there were more than 43 million (see fig. 1 on page 34).[197]

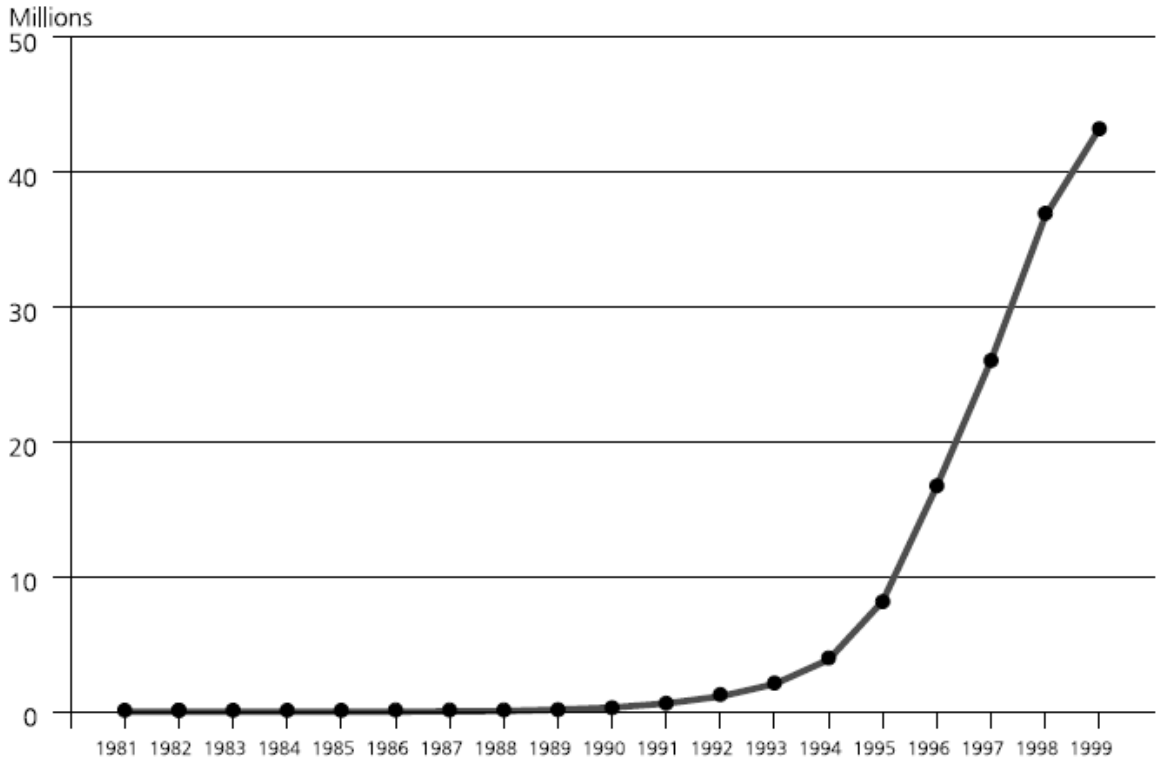

Fig. 1 Estimated Number of Internet Hosts, 1981-1999

Source: Houghton John and Peter Sheehan, 2000. Network Wizards (http://www.nw.com);

[193] Houghton John and Peter Sheehan, 2000, pg 2

[194] Houghton John and Peter Sheehan, 2000, pg 2

[195] Houghton John and Peter Sheehan, 2000, pg 2

[196] Houghton John and Peter Sheehan, 2000, pg 2

[197] Houghton John and Peter Sheehan, 2000, pg 2

Hardware, software, and wetware (digitalisation) supported technologies for the application of new computing and communications systems, including scanning and imaging technologies, memory and storage technologies, display systems and copying technologies, which now help users to realise the potential of the IT revolution.

John Houghton and Peter Sheehan argue that,

> In economic terms, the central feature of the IT revolution is the ability to manipulate, store and transmit large quantities of information at very low cost. An equally important feature of these technologies is their pervasiveness. While the most, earlier episodes of technical change have centred on particular products or industrial sectors, information technology is generic. It impacts on every element of the economy, on both goods and services, and on every element of the business chain from research and development to production, marketing and distribution.[198]

2.10 What is the Role of Cities in the Knowledge Economy?

As stated earlier, cities are focal points of the knowledge economy. Therefore, the urban knowledge economy thrives on talented people who create new knowledge. These people select the place of work based on highest salaries. They are also concerned with a series of place-based characteristics. Florida states that talented people are attracted by places where they can enjoy life.[199]

In the knowledge economy, one of the drivers of innovation is the exchange of tacit knowledge. Cities can provide a very good environment for this type of exchange. Knowledge exchange happens in the clusters of densely networked firms within the cities. Porter describes how clusters of firms serve global markets, while deriving their strength from a regional basis.[200] He discerns four conditions as essential in development:

> Factor conditions (quality of labour, capital, knowledge available), demand conditions (scale and quality of the regional home market), supplier industries (globally competitive

[198] Houghton John and Peter Sheehan, 2000, pg 2

[199] Florida R, 2000, pg 15

[200] Berg L and Winden W, 2004, pg 12

supplier, specialised services) and business strategy (rivalry between local firms but also willingness to co-operate in research, sales and marketing).[201]

Proximity still seems to matter in networks. Modern communication technology theoretically permits spatial dispersion. For example, face-to-face contacts appear to be very important as sources of technological information and in the exchange of tacit knowledge.[202] Howells argues that knowledge is codified at global level, while tacit knowledge is at local level.[203] Secondly, co-operation between actors requires mutual trust.[204] This normally holds when sensitive and valuable information is exchanged; for example, in a joint innovation project.[205] Since co-operation is a human phenomenon, it can therefore be argued that cultural proximity is an important factor in this respect.

A city's economic base can determine its prosperity in the knowledge economy, because successful cities are those that combine both local knowledge spill-overs and international best practice in the design, and specific actions,of innovations.[206]

Cities that previously were specialised in traditional industry and port activities did less well than cities that have a more diverse economic base.[207] The former cities have a tendency to have a lower educated population and lower quality of life.

Simmie states that innovative activity is highly concentrated in some metropolitan and regional capital cities.[208] He also reviews the hypothesis of local knowledge spill-overs as an explanation for the geography of innovation, and argues that it offers only a partial explanation.[209] The reason for this is mostly that many urban regions have universities and industrial R&D facilities. They join the top-ranking cities as centres of innovation. Secondly, innovation is not just driven by technological push factors, but also by demand-pulls - often by clients based in other advanced countries.[210] It has been argued that international contacts and networks conducted by face-to-face contacts, and facilitated by international hub airports,

[201] Berg L and Winden W, 2004, pg 12
[202] Berg L and Winden W, 2004, pg 12
[203] Howells J R L, 2002, pg 875
[204] Howells J R L, 2002, pg 875
[205] Berg L and Winden W, 2004, pg 12
[206] Berg L and Winden W, 2004, pg 13
[207] Berg L and Winden W, 2004, pg 13
[208] Berg L and Winden W, 2004, pg 12
[209] Berg L and Winden W, 2004, pg 12
[210] Berg L and Winden W, 2004, pg 12

are critical factors for international knowledge transfers. Finally, the most successful cities are those that are able to combine both rich local knowledge spill-overs and international best practice in the design and specifications of innovations. Because of face-to-face meetings to achieve many of these exchanges of experience, the geography of innovation is a function of both physical and time proximity.[211]

2.11 Chapter Summary

The purpose of this chapter was to further define and discuss the concepts of "city" and "knowledge economy" and to explore the nature of the relationship between these concepts. Section 2.1 provided an overview of the research strategy used and briefly discussed the main sources derived from this. Section 2.2 discussed the notion of "city". Next, section 2.3 focused on the major challenges that cities face. Section 2.4 presented a comparison of cities, based on the ratings obtained from the World Bank, while section 2.5 defined a scale of measurement for city performance. Thereafter, section 2.6 discussed the changing nature of cities in the 21st century, followed by section 2.7 which narrowed the focus to the current state of South African cities. Section 2.8 unpacked the notion of "knowledge economy", while section 2.9 explained what the characteristics of cities in the knowledge economy are. Lastly, section 2.10 explored the role of cities in a knowledge economy.

[211] Berg L and Winden W, 2004, pg 13

Chapter Three

Innovation and the Knowledge Economy

3.1 Introduction

The objective of this thesis is to determine the relationship between innovation and cities in a knowledge economy. For this purpose, the researcher conducted a conceptual study that entailed a critical analysis and review of the literature on innovation, the cities and knowledge economy.

The purpose of this chapter is to define and discuss the concept of "innovation" and the relationship between innovation and the knowledge economy. Section 3.1 lists and discusses the research strategy used and the main sources derived therefrom. Section 3.2 continues from section 1.1 and further discusses the notion of innovation. Section 3.3 presents the S-curve and explores the diffusion of innovation. Next, section 3.4 introduces the reader to the value of experimentation in innovation. The following section, 3.5, focuses on the goals and failures associated with innovation. Thereafter, section 3.6 examines the sources of innovation, while section 3.7 discusses the relationship between innovation and the knowledge economy. Section 3.8 delimits the focus to knowledge-based innovation, and section 3.9 assesses the relationship between innovation and the social conditions of markets. The chapter concludes with a summary of the most important points raised and arguments put forward in section 3.10.

3.2 The Notion of Innovation

Innovation is a process whereby radical and incremental changes in thinking, in processes and services, lead to novel processes, products and services on a global scale. Moreover, the term "innovation" refers to both radical and incremental changes in thinking, in processes, or

in services.[212] The term innovation is derived from Latin, where the root-term *nova* means new. It has been generally understood as the introduction of an alternative concept or method.[213] As mentioned in chapter 1 (section 1.1, p. 1), there are many different definitions of innovation. For example, innovation has been defined as an outcome, a process, or an experience that, over time, permeates the whole organisation.[214]

It is also important to have some background on innovation as a concept. For example, by looking back from the date of the first printing press (1440, invented by Johannes Gutenberg), to the explosion of the web in 1991, invented by Tim Berners-Lee, both were implemented as communication tools. The best way to describe the history of innovation is to follow a chronological order over centuries.[215] For example, the printing press was invented in 1440, while paper was invented in China by Ts'ai in 105, which enabled people to print on paper for communicative purposes. But, today, we have blogging, twitting and facebook in the web for communications. Take note of this change from 105 to 1991, it makes the life of communication better and better, due to innovativity.

Innovation is not only about value creation, but is about the realisation of core values.[216] It assists people and organisations to achieve their full potential through the shared pursuit of its six core values: capability, inclusivity, possibility, opportunity, sustainability and responsibility.[217] In order for innovation to do so, each core value must be linked to a specific organisation's context that must be considered as part of the innovation effort. In this manner, innovation lives in the balance of systemic freedom and systemic discipline.[218]

Systemic freedom and systemic discipline are necessary systems to discover and develop ideas to create radical new values in innovation.[219] Freedom and discipline are fundamental forces of innovation success, and innovators must strive to maintain a balance between them at all times.

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[212] Mckeown Max, 2008, (www.wikipedia.org/wiki/innovation accessed on 10-03-2009)

[213] Luecke Richard and Katz Ralph, 2003, (www.wikipedia.org/wiki/innovation on 12-03-2009)

[214] De Cagna Jeff, 2007, pg 5

[215] Centuries can be outlined as follows: Ancient BC, early AD, 15th century the 1400s, 16th century the 1500s, 17th century the 1600s, 18th century the 1700s, 19th century the 1800s, 20th century the 1900s and 21st century the 2000

[216] De Cagna Jeff, 2007, pg 4

[217] De Cagna Jeff, 2007, pg 4

[218] De Cagna Jeff, 2007, pg 5

[219] De Cagna Jeff, 2007, pg 5

Each of the six core values emphasise a different aspect of innovation. Capability (strategic value) is when innovation is about building stronger and more capable organisations. Building a capacity for innovation requires an intelligent, strategic and disciplined approach. Inclusivity (technological value) emphasises innovation as an intrinsically social and collaborative process.[220] Possibility (cultural value) is when innovation embraces the discovery of what is possible for organisation.[221] Opportunity (intellectual value) is when innovation involves the application of experience and knowledge,[222] and where human intellect identifies and shapes innovation opportunities in ways that enable actions. Sustainability (market value) is when innovation creates sustainable futures for organisations or firms within the city or cities.[223] The work of innovation must be made sustainable by means of consistent investment in resources. Responsibility (leadership value) involves innovation that requires managers and leaders to be responsible and vigilant for the success of their organisations.[224]

The above-mentioned core values can be divided into two groups based upon the needs of freedom (inclusivity, possibility and opportunity) and also based on the needs of discipline (capability, sustainability and responsibility).[225] For innovation to flourish in organisations, it needs both freedom and discipline to be present. For example, innovators must have the freedom to imagine what is possible to develop their ideas collaboratively, and then experiment those ideas in the marketplace.[226] Organisations must have the requisite discipline to choose only the most promising ideas for further consistent testing and investing in them.[227] Discipline can create the opportunity for freedom, and freedom can recognise the constant need for discipline to prevent creativity to descend into chaos. Therefore, freedom and discipline are fundamental forces of innovation successes.[228]

There are many dynamics and demands of innovation that can be seen through the lenses of the six core values that are keys to any innovation effort(s). These values exist to keep

[220] De Cagna Jeff, 2007, pg 8
[221] De Cagna Jeff, 2007, pg 8
[222] De Cagna Jeff, 2007, pg 8
[223] De Cagna Jeff, 2007, pg 8
[224] De Cagna Jeff, 2007, pg 8
[225] De Cagna Jeff, 2007, pg 5
[226] De Cagna Jeff, 2007, pg 5
[227] De Cagna Jeff, 2007, pg 5
[228] De Cagna Jeff, 2007, pg 5

sustainability within the organisations in the cities. The co-ordination of the on-going relationship between the six values and their linked organisations' contexts is a critical element for the success of innovation. These six core values provide useful thinking about the wide variety of innovation opportunities on which any organisation can capitalise.[229] For example, they assist management by guiding the innovation process and also spark a deeper passion for the work of innovation among potential contributors. They imbue the pursuit of innovation beyond the goal of creating new products and services. They also make innovation the priority of an organisation.

Furthermore, as a process, innovation has been associated with human beings, because they have a tendency to think about new and better ways of doing things, and to try them out in practice. This also leads to the argument that the world would be very different without many of the modern-day inventions (e.g. aeroplanes, automobiles, telecommunications, etc.) that came about as a result of innovation. They also include scientific and other forms of research, technology, commerce, social systems, and economic developments, amongst others.

Given its importance, innovation has, however, not always received the scholarly attention it deserves. For instance, students who study economics (specifically economic changes) focus on factors, such as capital accumulation or the working of markets, rather than on innovation. According to Fagerberg,[230] this is changing because there is, naturally, a wide range of approaches that conceptualise innovation in scholarly literature.[231] Fagerberg also outlines that an important differentiation is generally made between invention and innovation, where invention is the first occurrence of an idea for a new product or process, while innovation is the first attempt to carry it out into practice.[232]

What innovation is not

Part of the reason why innovation has not received much attention in scholarly circles is that innovation is often confused with similar concepts, like invention, development processes and policies, entrepreneurship, competition and creativity. Firstly, innovation is distinct from the concept of invention. The following example illustrates the problem of distinguishing between the two concepts, innovation and invention: An improvement of existing forms or

[229] De Cagna Jeff, 2007, pg 6

[230] And other literature on innovation

[231] Fagerberg Jan, 2004, (www.wikipedia.org/wiki/innovation accessed 08-05-2009)

[232] Fagerberg Jan, 2004, (www.wikipedia.org/wiki/innovation accessed 08-05-2009)

compositions of processes might be both an invention and an innovation, or either, if not considered substantive enough. According to the literature, an idea, a change, or an improvement is an innovation only when it is put into use and effectively causes a social or commercial reorganisation.[233] In other words, while both invention and innovation have unique implications, innovation is related to acceptance in society, profitability and the expectation of market performance.

Fagerberg further states that another complicating factor is the problem to distinguish between innovation and invention in the event of continuous processes.[234] For instance, a motor vehicleas been radically improved,compared to the first commercial models, due to the incorporation of a very large number of different inventions or innovations.[235] Similarly, the first versions of virtually all significant innovations today (e.g. the steam engine and aeroplane) were crude, unreliable versions of their modern day equivalents. Kline and Rosenburg argue that it is a serious mistake to treat an innovation as though it is a well-defined homogenous thing that could be identified as entering the economy at a precise date, or becoming available at a precise point in time.[236] In fact, most important innovations undergo drastic changes in their lifetimes - changes that may, and often do, totally transform their economic significance. The subsequent improvements in an invention, after its first introduction, may be vastly more important economically than the initial availability of the invention in its original form.[237]

Innovation is said to occur when the innovator uses an invention or an idea to change how the world works, how people organise themselves, or how they conduct their lives.[238] In this view, innovation occurs whether or not it brings a positive or negative impact to the organisation or society.[239]

Secondly, innovation is commonly confused with general development processes and policies. Development is the process of the progressive mastery of the environment in the broadest sense, for example the physical, cultural, socio-economic, political, intellectual,

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[233] From internet site: http://www.answers.com/topic/innovations (opened on 23-02-2009)

[234] Fagerberg Jan, 2004, (www.wikipedia.org/wiki/innovation accessed 08-05-2009)

[235] Fagerberg Jan, 2004, (www.wikipedia.org/wiki/innovation accessed 08-05-2009)

[236] Kline S J and Rosenburg N, 1986, pg 68

[237] Kline S J and Rosenburg N, 1986, pg 68

[238] Extracted from: http://www.wikipedia.org/wiki/innovation (last opened on 22-11-2008)

[239] Extracted from: http://www.wikipedia.org/wiki/innovation (last opened on 22-11-2008)

religious, spiritual perspectives, etc. In its broadest sense, the notion of development incorporates all aspects of individuals' well-being, from their health status to their economic and political freedom.

Thirdly, innovation and entrepreneurship are commonly referred to as synonyms. Entrepreneurship is a concept that tries to redress or balance the deficiencies within the market or society/community. For example, if a certain community or society lacks transport to town, work and/or schools, then providing suitable and reliable transportation constitutes entrepreneurship. As the markets or circumstances change within the affected communities or societies, then that entrepreneurship will weaken. This means that entrepreneurship can change according to the market, which is like, or unlike, in the case of innovation.

These two concepts (entrepreneurship and innovation) are often found in different ontological dimensions within firms, be it in cities or at regional and national level. This makes entrepreneurship more explicit and implicit to be understood, and easy to be engineered. Moreover, enhancing effectiveness and efficiency of entrepreneurship will lead to higher levels of innovation, and vice versa.

Innovation is also distinct from the concept of competitiveness. In particular contexts, competition has many definitions, but is generally understood as the ability of a firm to increase in size, magnitude, market share and profitability. In the traditional economic theory, comparative costs of production determine competitiveness at firm level. The way to become competitive is to produce more cheaply for maximum profit; for example, finding ways to reduce labour costs.

What makes a standard definition of innovation problematic is when it necessitates the involvement of another concept, such as creativity. For example, innovation involves creative ideas to make some specific and tangible differences in the domain in which the innovation occurs. Amabile and Conti propose that:

> All innovation begins with creative ideas. We define innovation as the successful implementation of creative ideas within an organisation. In this view, creativity by individuals and teams is a starting point for innovation; the first is necessary but not sufficient condition for the second.[240]

[240] Amabile T M and Conti R, 1996, pg 1155

Therefore, for innovation to occur, it needs the generation of creative ideas or insights, where these insights might be operationalised to make a genuine difference, such as in new or altered business processes within an organisation, or changes in the products and services provided. Innovation is the successful implementation of creative ideas within an organisation.[241] From this point of view, an individual can display creativity, but innovation occurs only in the organisation's context.

The difference between creativity and innovation is universal in the innovation literature, as observed in innovation studies from some in-depth work on innovation in organisations, teams and individuals. For example, this has been illustrated in the work of J. L. Byrd,[242] who introduced the *Creatrix Inventory,* which can be used examine innovation and what is behind it. She developed the innovation equation as follows:

> "Innovation = Creativity multiplied by Risk Taking"

Hence, the difference between innovation and creativity is that innovation is the product of creativity and risk-taking. This means that, to be innovative, creativity and risk should be taken into consideration, which means that creativity is a component of innovation.

What innovation is

The explanations provided above provide evidence that, when dealing with innovation at organisational level, the emphasis is to create a capacity for innovation. Innovative capacity can be increased in organisations without expecting each person, or someone, to champion the innovation in question, to be an innovator. Indeed, an organisation or team comprised of only innovators usually produces nothing but chaos.[243] This means that innovative capacity needs to be deliberately planned, designed and built, where the key is fostering creativity and calculated risk-taking in employees.[244] It is important to create an environment and culture that will support them.[245] While this is easier said than done, it is necessary to create an organisation that first values, then creates, and ultimately thrives on innovation.

Luecke and Katz gave the following convenient definition of innovation from an organisational perspective:

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[241] Amabile T M and Conti R, 1996, pg 1155

[242] Dr J L Byrd is co-author of the "*The Innovation Equation Building Creativity and Risk taking Organization*"

[243] Byrd Jacqueline, 2003, (www.wikipedia.org/wiki/innovation accessed 12-03-2009)

[244] Byrd Jacqueline, 2003, (www.wikipedia.org/wiki/innovation accessed 12-03-2009)

[245] Byrd Jacqueline, 2003, (www.wikipedia.org/wiki/innovation accessed 12-03-2009)

> Innovation… is generally understood as the successful introduction of a new thing or method…
>
> Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services.[246]

Innovation has been valued by the marketplace and has been long recognised as a creator and sustainer of enterprise, but innovation can also destroy at the same time. More than half a century ago, economist Joseph Schumpeter described the economic, sociological, and organisational impacts of innovation and its winds as a creative destruction.[247] Those winds sweep away both old ways of doing things and the enterprises and institutions that cling to them. During the 19th century, Richard Luecke explained that innovations in mass production doomed local shoemakers, dressmakers, and many other artisans, as the pattern which has been repeated today by superstores, like Home Depot, Borders and Staples, which decimate the ranks of small local hardware stores, independent booksellers and office supply retailers, respectively.[248] Likewise, innovations in electronics, pharmaceuticals and other fields that include services, continually undermine established products and services. Enterprises that fail to keep pace with these innovations are swiftly swept from the field.

Joseph Schumpeter defines economic innovation in the *Theory of Economic Development* of 1934, as follows:

> The introduction of a new good, that is one with which consumers are not yet familiar, or of a new quality of a good; the introduction of a new method of production, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially; the opening of a new market; that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before. The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created; the carrying out of

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[246] Lucke Richard and Katz Ralph, 2003, (www.wikipedia.org/wiki/innovation accessed 15-03-2009)

[247] Lori L, 1996. "Government's Role in Primary and Secondary Education." *Economic Review* (Dallas. Tex.) Jan 1999 issue.

[248] Luecke Richard and Katz Ralph, 2003, (www.wikipedia.org/wiki/innovation accessed 15-06-2009)

> the new organisation of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position.[249]

Innovation also needs to have principles, the first of which involves systematic study and analysis. Purposeful and systematic innovation begins with thinking through the sources of innovative opportunities and the analysis of these opportunities. In different areas, it has been noted that different sources have different importance at different times. Demographics, for instance, may be of very little concern to innovators in fundamental industrial processes to someone searching, say, for the missing link in a process, such as papermaking, where there is a clear incongruity between economic realities. But, all the sources of innovative opportunity should be systematically analysed and systematically studied. It is not enough to be alerted to them - the search has to be organised, and must be done on a regular basis since innovation is both conceptual and perceptual. This entails going out and speaking to the customers, the users, to see what their expectations, their values and their needs are, and then working out analytically what the innovation has to be to satisfy opportunities.

Secondly, for innovation to be effective, it has to be simple and has to be focused. All effective innovations are simple by nature. Even the innovation that creates new uses and new markets should be directed towards a specific, clear, designed application. It should be focused on a specific need that it satisfies, and on producing a specific end result. Effective innovations start small and focus to do one specific thing. For example, a moving vehicle that draws electric power while it runs along rails; the innovation that made this possible was the electric streetcar.

Finally, innovators must not only try to innovate for the future, but also for the present. An innovation may have a long range of impacts that may not reach full maturity until a number of years later. For example, as we have seen, the computer did not begin to have any sizeable impact on the way business was done until the early 1970s - 25 years after the first working models were introduced. However, the computer possessed practical application ability (scientific calculation, payroll or simulation) from its early days.

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[249] Schumpeter Joseph, 1934, extracted from http://www.wikipedia.org/wiki/innovation, accessed 03-03-2009)

3.3 The S-Curve (The Diffusion of Innovation)

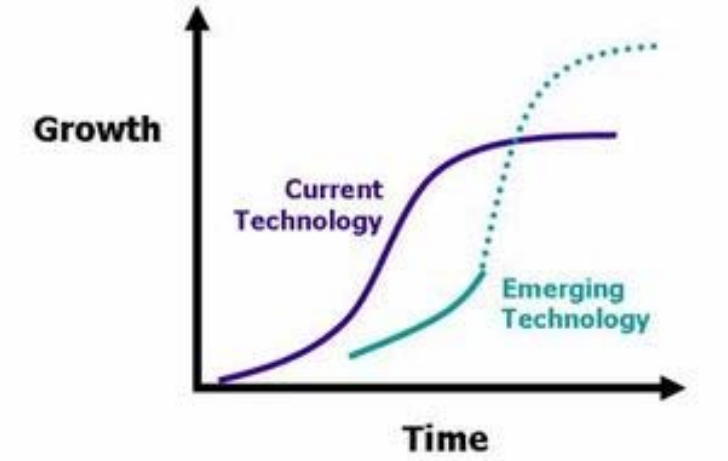

Fig. 2 Diffusion of Innovation

Source: (Thomke H. Stefan's book (2003) extracted from http://www.wikipedia.org/wiki/innovation, accessed on 03-03-2009)

The above graph is called the S-curve graph, which explains the diffusion of innovations within the human world. This term "diffusion" is commonly used to describe the process by which individuals and organisations in a society or economy adopt a new technology, or replace an older technology with a new one. This means that diffusion moves from current technology to emerging technology, and this diffusion spreads throughout the population or society. It is an intrinsic part of the innovation process; that is why it is being measured by growth revenue versus time (productivity versus time). In fact, without diffusion, innovation would have little social or economic impact on our society.

Whether you pursue innovation through incremental or radical means, you will eventually encounter practical constraints that either impede further progress, or make it prohibitively expensive. This is caused by the early stages of innovation, where growth is relatively slow while the new product establishes itself and, when customers begin to demand the product, growth picks up automatically causing an increase in growth. Towards the end of its life cycle, growth slows or becomes steady because of the saturation of markets, or may even begin to decline. At this stage, new innovative ideas must replace older ones and continue to drive growth upwards. In the figure above, the first curve represents current technology and the second curve, an emerging technology whose current yield lowers growth but, eventually,

will overtake current technology and lead to an even greater level of growth. The length of life will depend on many factors.[250]

3.4 Value of Experimentation in Innovation

Experimentation is the period between the earliest point in the design cycle and the final release or launch of the product or service. Indeed, innovation needs experimentation to be successful practically. This means that the business model must be constructed from an innovative idea that will radically redesign the delivery of the value of focus on the customer. These new business models and customer experiences cannot be tested through traditional market research methods, but with experimentation.

In *Experimentation Matters*[251] it has been argued that, in the organisational point of view, to have an ability to innovate, the organisation must undergo a series of experiments on innovation, whether successful or not, that will create new services and new products.[252] To add more from the above statement, innovation should give positive or negative results, which is why experimentation can be either successful or a failure. It becomes difficult for innovators to bypass the experimentation stage, since they have to observe the results to determine whether these results are positive or negative, regardless of the unfortunate circumstances that could have been experienced during the experimentation process or stage.[253] These unfortunate circumstances might include the cost, time and quality at the time.

Thomke also outlines six principles that companies (any city, and other organisations) can follow to unlock their innovative potential: anticipate and exploit early information through a front-loaded innovation process, experiment frequently but do not overload your organisation, integrate new and traditional technologies to unlock performance, organise for rapid experimentation, fail early and often, but avoid mistakes, and manage projects as experiments.[254]

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[250] Thomke H Stefan's book, 2003, extracted from: http://www.en.wikipedia.org/wiki/Innovation (last opened on 03-03-2009)

[251] Thomke H Stefan's book, 2003, extracted from: http://www.en.wikipedia.org/wiki/Innovation (last opened on 03-03-2009)

[252] Thomke H Stefan's book, 2003, extracted from: http://www.en.wikipedia.org/wiki/Innovation (last opened on 03-03-2009)

[253] Thomke H Stefan's book, 2003, extracted from: http://www.en.wikipedia.org/wiki/Innovation (last opened on 03-03-2009)

[254] Thomke H Stefan's book, 2003, extracted from: http://www.en.wikipedia.org/wiki/Innovation (last opened on 09-03-2009)

3.5 Goals and Failures of Innovation

Innovation definitely has goals and failures.[255] The goals of innovation are the goals of the organisation or society, because what has been achieved from innovation is what has been achieved by the organisation or society. Organisations (cities) have goals and objectives and they need innovation to succeed towards their objectives and goals. The organisational objectives can include the following: improvements of quality service delivery, the creation of new markets, improved production processes, reduction of energy consumption, replacement of products or services, reduced labour costs, conforming with regulations, etc…. These objectives may vary by industry and by market positioning.

Therefore, the above-mentioned objectives may also vary between improvements to products, processes, services and dispel a popular myth that innovation deals mainly with new product development. Most of the objectives could apply to any organisation, be it a manufacturing facility, marketing firm, hospital, or local government.[256]

If innovations fail, then there are many reasons that cause these failures; i.e. there are causes of failures that have been researched, and findings vary in consideration. Normally, they are divided into two: external pressures, as well as internal pressures, can cause innovations to fail. External pressures are influences that come from outside the organisation from time to time, and are beyond control. Internal pressures are within the organisation and, from time to time, they can be controlled by means of rules and regulations. Internal pressures are associated with the cultural infrastructure within the organisation, but also with the innovation process itself. With regard to the cultural infrastructure within organisations, there are various causes, but there are common aspects across the board, in all organisations, which are as follows: poor knowledge management, poor communication, poor empowerment, poor organisation and poor leadership. Innovation processes also have the following common causes of failures within organisations: poor communication and access of information, poor monitoring of results, poor participation teams, poor alignment of action to goals, and poor goal definitions.[257]

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[255] Research findings vary, ranging from 50% to 90% of innovation projects judged to have made little or no contribution to organisational goals. One survey regarding product innovation quotes that, out of 3000 ideas for new products, only one becomes a success in the market-place. Failure is an inevitable part of the innovation process, and most successful organisations factor in on an appropriate level of risk of change

[256] Thomke H Stefan's book, 2003, extracted from wikipedia: http://www.en.wikipedia.org/wiki/Innovation (last opened on 03-03-2009)

[257] O'Sullivan David, 2002, pg 80

There are means to mitigate the failures of innovations, especially the innovation processes' effective goal definitions, which require the organisations to state their goals very explicitly and understandably to all in the team for innovation processing. The involved team members must align their actions with the organisation's articulated goals. Effective management needs to implement and monitor the actions of the team members in the innovation processes. All in all, failures should be identified and screened as early as possible. This will avoid unsuitable ideas destroying the scarce resources and, therefore, debates and discussions can be used to avoid failures, while taking note of history or lessons learned previously.

3.6 Sources of Innovation

Innovation is not from space, which means that there must be sources where people can find or come across innovation. Innovation is achieved by many ways; for example, an innovator can invent a product and sell it.[258] That then becomes an innovation and the codified procedure or knowledge of the invention is the source of innovation. By marketing products or services with the written strategy is a source of innovation. Innovation can be developed by less formal on-the-job modifications of practice, through the exchange and combination of professional experience and by many other routes. The most radical and revolutionary innovations tend to emerge from R&D, while more incremental innovation may emerge from practice, but there are many exceptions to each of these trends.

Nowadays, innovations can be revealed by using software, such as an open source and, in such software of innovation, the creativity of the users, or community of users, can further develop programmes for their specific use. Whether innovation is mainly supply-pushed[259] or demand-led[260] has been a hotly debated topic, and what exactly drives innovation in organisations and economies remains an open question.

Innovation does not just happen within the industrial supply side, or as a result of the articulation of user demand, but through complex processes that link many different players, not only developers and users, but a wide variety of intermediary organisation such as consultancies, standard bodies, etc. Work on social networks suggests that much of the most successful innovation occurs at the boundaries of organisations and industries, where the

[258] Like Steve Jobs of Apple Inc. invented ipods, ipads, iphones, and mac-books. All the products became his innovation and they (the products) excelled in the market from US, Europe and in other parts of the world

[259] Which means innovation is based on new technological possibilities

[260] This also meant that innovation is based on social needs and market requirements

problems and needs of users and the potential of technologies can be linked in a creative process that challenges both.[261]

3.7 Innovation and the Knowledge Economy

The concept of innovation, as applied to a segment of the economy, defines knowledge work,[262] which occurs in all professions as well as in all segments of the economy. The scope of the knowledge economy is not confined to professionals (the knowledge workers) and high-tech businesses. Innovation can be applied to any industry, and knowledge industries are not restricted to technology-based industries, per se.

Florida found that cities have abundant work and lifestyle opportunities for a creative class of people and, therefore, a wide range of economic production activities occur there.[263] The high concentration of these economic production activities leads to new production processes;[264] thus, the cities experience human creativity and technological innovation. These processes yield an innovation process, which becomes a sustainable process when it is continued, and it constitutes the sustainable knowledge economy, where ideas and innovation are recognised and valued.

The importance of learning cannot be ignored, because it forms the basis for innovation and knowledge creation. Research and development activities at macro-level, and individual apprenticeship at individual level, are examples of an innovation process. It is also imperative to take note of the corresponding value of innovation, as it is essential to realise the potential of the technological innovation, which creates benefits that reduce costs. It must be noted that both value innovation and technological innovation are closely inter-related. Therefore, this continued process of value innovation, based on continued learning, then becomes the key to sustainability.

The information technology also fuels this process. These interactions create new opportunities for continuous learning. This process becomes crucial to the long-term sustainability of the knowledge economy.[265] Cities are inhabited with knowledge assets, such as tertiary educational institutions, research institutes and technological centres. This gives

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[261] Thomke H Stefan's book, 2003, extracted from: http://www.wikipedia.org/wiki/innovation (last opened on 10-09-2008)

[262] Yeo B J K, 2010, pg 73

[263] Florida R, 2002, pg 15

[264] Desrochers P, 2001, pg 381

[265] Glaeser E, 1999, pg 259

rise to human capital, which is an essential component that can be leveraged to promote economic development in an intangible asset-based economy.[266] This statement argues that economic growth depends on investments in education and new work-based learning and training procedures.[267]

> The continuing growth in per capita incomes of many countries during the nineteenth and twentieth centuries is partly due to the expansion of scientific and technical knowledge that raises the productivity of labour and other inputs in production. The increasing reliance of industry on sophisticated knowledge greatly enhances the value of education, technical schooling, on-the-job training and other human capital.[268]

Therefore, this proves that human capital forms a basis for innovation by means of continuous learning.

3.8 Knowledge-based Innovation

Knowledge-based innovation is the innovation process that is enhanced by knowledge. This means that all the knowledge needed for a given knowledge-based innovation has come together, and the innovation will take off. It has the longest lead time as compared to other innovations.[269] Its life cycle consists of a long timespan between the emergence of the new knowledge and its being applied to technology,[270] but there is another long period before the new technology turns into products or services in the market place.[271] The knowledge is not obliged to be scientific or technical - even social innovations, based on knowledge, can have equal or even greater impact.

Knowledge-based innovation is different from other innovations based on basic characteristics, which are as follows: time span, casualty rate, predictability, and in the

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[266] DeVol R, 2002, pg 73

[267] DeVol R, 2002, pg 75

[268] Becker G, 1992, pg 88

[269] For example, the Wright Brothers exemplify the method at its best. They thought through carefully what knowledge was necessary to build an aeroplane for manned, motored flight. Next they set about to develop the pieces of knowledge that were needed, taking the available information, testing it first theoretically, then in the wind tunnel, and then in actual flight experiments, until they had the mathematics they needed to construct ailerons, to shape the wings and so on

[270] Extracted from: http://www.skymark.com/resources/notes.asp (last opened on 04-10-2007)

[271] For example, Rudolph Diesel designed the engine which bears his name in 1897. Everyone at once realised that it was a major innovation. Yet, for many years there were no practical applications. Then in 1935, an American, Charles Kettering, totally redesigned Diesel's engine, rendering it capable to being used as the propulsion unit in a wide variety of ships, locomotives, trucks, buses and passengers cars

challenges that it poses to the city. This makes knowledge-based innovation temperamental, capricious and hard to manage.[272]

The long lead time for knowledge-based innovations is not confined to science or technology, because the lead time for knowledge to become a knowledge-based innovation seems to be inherent in the nature of knowledge. It also, from time to time, applies equally to innovations that are based on non-scientific and non-technological knowledge. For example,

> The Comte de Saint-Simon developed the theory of the entrepreneurial bank, the purposeful use of capital to generate economic development, right after the Napoleonic wars. Until then bankers were moneylenders who lent against security (e.g. the taxing power of a prince). Saint-Simon's banker was to invest that is to create new wealth-producing capacity. Saint-Simon had extraordinary influence in his time, and a popular cult developed around his memory and his ideas after his death in 1826. Yet it was not until 1852 that two disciples, the brothers Jacob and Isaac Pereire, established the first entrepreneurial bank, the Credit Mobilier, and with it ushered in what we now call finance capitalism.[273]

Today, people experience a similar lead time in respect to learning theory. The scientific study of learning began around 1890 with Wilhelm Wundt in Germany and William James in the United States. After World War II, two Americans, B.F. Skinner and Jerome Brunner, both at Harvard, developed and tested basic theories of learning, Skinner specialised in behaviour, and Brunner in cognition. Yet, only now learning theory is beginning to become a factor in our universities. In other words, the lead time for knowledge to become applicable technology and begin to be accepted on the market is between 25 and 35 years.

The lead time for knowledge to become a knowledge-based innovation seems to be inherent in the nature of knowledge. It is not clear, but perhaps it is not pure coincidence, that the same lead time applies to new scientific theory. In his path-breaking book *The Structure of Scientific Revolutions* of 1962,[274] Thomas Kuhn showed that it takes approximately 30 years

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[272] Extracted from: http://www.library.aukland.ac.nz/subjects/bus/infosources/eship_technology.htm (last date opened on 07-08-2008)

[273] Drucker Peter F, "*The Discipline of Innovation*". Extracted from: http://www.daphne.palomar.edu/eschltze/smallbiz/druckerthe%20discipline%20of%20innovation.htm (last opened on 26-05-2009)

[274] Extracted from: http://www.supplyline.org/newsletters/ *The Entreprener* May 2004

before a new scientific theory becomes a new statement to which scientists pay attention and use in their own work.

The second characteristic of knowledge-based innovations and a truly unique one is that they are seldom based on one factor, but on the convergence of several different kinds of knowledge,[275] not all scientific or technological. In this century, few knowledge-based innovations have benefited humanity more than the hybridisation of seeds and livestock, which enables the earth to feed a much larger population than anyone would have thought possible 50 years ago.

The first successful new seed was hybrid corn. Henry C. Wallace produced it after 20 years of hard work. Hybrid corn has two knowledge roots. One was the work of the Michigan plant breeder, William J. Beal, who, around 1880, discovered hybrid vigour. The other was the rediscovery of Mendel's genetics by the Dutch biologist, Hugo de Vries. The two men did not know of each other, and their work was totally different both in intent and content. But only by combining it could hybrid corn be developed.

As already noted, the computer required the convergence of no less than five different forms of knowledge: a scientific invention, the audition tube, a major mathematical discovery, the binary theorem, a new logic, the design concept of the punch card, and the concepts of program and feedback. Until all these were available, no computer could have been built.[276] Charles Babbage, the English mathematician, is often called the "father of the computer". It has been argued that what kept him from building a computer was only the unavailability of the proper metals and of electric power during his time, but this is a misunderstanding.[277] Even if Babbage had the proper materials, he could at best have built the mechanical calculator, which we now call a cash register. Without the logic, the design concept of the punch card and the concept of program and feedback, none of which Babbage possessed, he could only imagine a computer.

Until all the needed knowledge can be provided, knowledge-based innovation is premature and will fail. In most cases, innovation occurs only when these various factors are already known, already available, and already in use somewhere.[278] This was the case with the

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[275] Extracted from: http://www.skymark.com/resorces/notes.asp (last opened on 04-10-2007)

[276] Extracted from: http://www.ssbea.mercer.edu/tm600/m2inst.html (last opened on 06-01-2009)

[277] Extracted from: http://www.ssbea.mercer.edu/tm600/m2inst.html (last opened on 06-01-2009)

[278] Extracted from: http://www.vedpuriswar.org/book summary/innovation book summary.html

Universal Bank of 1865 to 1875, and was the case with the computer after World War II (WWII).[279] Sometimes, the innovator can identify the missing pieces and then work at producing them. Joseph Pulitzer, Adolph Ochs and William Randolph Hearst largely created modern advertising.[280] This then created what is being called "media" today - the merger of information and advertising in mass communications.

But, until all the knowledge needed for a given knowledge-based innovation has come together, the innovation will not take off; but will remain stillborn. Indeed, until all the knowledge converges, the lead time of a knowledge-based innovation usually does not even begin.

3.9 Innovation and Social Conditions of Markets

Generally, no business can survive without marketing, which consists of the following processes: budget, planning, choosing the target market, market niche, and selecting the right people with the skills and capacity for marketing. Expectations are that potential consumers will knock on the door of their supplier. This means that firms must strategise when they choose their market niche, and prepare to tackle their competitor by providing necessary resources, such as technologies, etc., which they will use to produce quality products or services for their potential clients or customers to beat competition. Firms need to make their investments to transform technologies and to access markets that can only be expected to generate revenues some time in the near future.

The very same firms must combine resources in an attempt to transform their firms by producing sale-able products. This also means that, to strategise firms (organisations) one must bring finances and/or organise resources to be innovative, due to the definition of innovation, which says that innovation requires learning about how to transform technologies and access markets in ways that can render an innovation process.[281] An innovation process can be uncertain due to the given definition, that is, what needs to be done to learn about transforming technologies to access markets. This means that there is a need for learning and therefore, investment in learning becomes a priority, but an innovative strategy can confront the uncertain character of an innovation process again, which means that what has been

[279] Extracted from: http://www.vedpuriswar.org/book summary/innovation book summary.html

[280] Extracted from: http://www.vedpuriswar.org/book summary/innovation book summary.html

[281] O'Sullivan David, 2002, pg 81

learned today provides a foundation for what can be learned tomorrow, to achieve an accumulative innovation process.[282]

The economic society shows that marketing outcomes from innovation can be studied through different lenses, for example, the industrial organisational approach of markets that characterises the degree of competitive pressure, and the consequent modelling of firm behaviour that often uses sophisticated theoretical game tools. At the same time, the mathematical modelling has shifted the ground away from an intuitive understanding of markets, consisting of market demand and supply along price and quantity dimensions, and mathematical models have given powerful assistance to this. These mathematical models can assist policy makers and managers to group for more intuitive and less theoretical analyses, which they can relate to pragmatics.

According to management literature, there is a vast array of relatively simple and intuitive models for both managers and consultants from which to choose, where you will find that most of these models provide insights to the policy makers and managers who provide a strategic plan that is consistent with the desired aims. In general, these models often fail to offer insights, due to the adoption of frameworks into situations, where the situational analyses of these models are often descriptive. This means that, on an academic point of view, there often is a divorce between industrial organisation theory and strategic management models. That is why economists view management models as being too simplistic, and strategic management consultants perceive academic economists as being too theoretical, and the analytical tools that they devise as too complex for managers to understand.[283]

3.10 Conclusion

Innovation has been defined as a process, and the Mckeown definition has been adopted for the purpose of this research. The innovation refers to both radical and incremental changes in services, in thinking and in processes.[284] This means that innovation is a work process, therefore, innovation requires knowledge and often needs great ingenuity of skills; hence it is a multi-dimensional tool. There clearly are people who are more talented innovators, and also, innovators rarely work in more than one area. In innovation, as in any other work, there

[282] Extracted from: http://www.dipartmento.dse.uniroma1.it/dottorato/papers/lazonick.pdf

[283] Extracted from: http://www.prevailed.org/innovation/encylopedia.htm (last opened on 26-05-2008)

[284] Mckeown Max, 2008 (www.wikipedia.org accessed 10-03-2009)

is talent, ingenuity, and predisposition. But, when all is said and done, innovation becomes hard, focused, purposeful work that makes very great demands on diligence, on persistence and on commitment. If these are lacking, no amount of talent, ingenuity, or knowledge will avail.

To succeed, innovators must build on their strengths. Successful innovators examine opportunities over a wide range. But, in innovation, it may be more important to build on one's strengths because of the risks of innovation and the resulting premium on knowledge and performance capacity. For example, businesses do not do well in something they do not really respect; for example, no pharmaceutical company can run as is, it must have scientifically minded people who view themselves as serious and want to do well. Innovations similarly need to be temperamentally attuned to the innovative opportunity. It must be important to them and also make sense to them, otherwise they will not be willing to do persistent, hard, frustrating work that successful innovation always requires.

Finally, innovation has an effect in the economy and society, a change in the behaviour of customers, teachers, farmers, eye surgeons, and of people in general. It is a change in a process, i.e. how people work and produce something. Therefore, innovation always has to be close to the market, focused on the market, and indeed be market-driven.

3.11 Chapter Summary

This chapter focused on defining and discussing the concept of "innovation" and explored the nature of the relationship between this concept and the knowledge economy. Section 3.1 summarises the research strategy used and main sources employed. Section 3.2 unpacks the notation of what comprises "innovation". Section 3.3 discusses the diffusion of innovation by means of the S-curve. Section 3.4 examines value experimentation, concerned with innovation. Section 3.5 focuses on the goals and failures of innovation, while section 3.6 introduces the reader to the various sources of innovation. Next, section 3.7 explores the relationship between innovation and the knowledge economy. Following this, section 3.8 narrows the scope to knowledge-based innovation, while section 3.9 discusses the relationship between innovation and the markets' social conditions. Lastly, the chapter concludes with the main points and arguments summarised in section 3.10.

Chapter four

The Relationship between Innovation and Cities in the Knowledge Economy

4.1 Introduction

The purpose of this study is to determine the relationship between innovation and cities in the knowledge economy. In this context, innovation is regarded as a process, and cities as the prime centres that facilitate this process in the knowledge economy. This is in the assumption that innovation is a necessary activity in the cities, as innovation can be applied to any industry, and knowledge industries are not restricted to technology-based industries. Widespread in the literature of management is that innovation is the central capability of all organisations that are interested in maximising their opportunities for success in the 21st century. Thus, cities must pay attention to what happens in the outside world (i.e. the transformation of economies, globalisation, IT revolution, etc.). For this purpose, the researcher has conducted a conceptual study that entailed critically analysing and reviewing the literature on cities, innovation and the knowledge economy, in a manner that incorporates multiple views from different authors.

The purpose of this chapter is to explore the relationship between innovation and cities in the knowledge economy era.

4.2 Relation between Innovation and the Cities in the Knowledge Economy Era

Cities are the focal point of the knowledge economy, because knowledge is produced, processed, exchanged and marketed mainly in cities. Because of globalisation, cities must compete with each other on a global scale to attract investments, knowledge and tourists.

In the era of knowledge economy, cities depend on intelligence disciplines, governments, the private sector, universities, etc. to sustain their relation with innovation.

This is on the assumption that the world is moving into an economic dispensation called "knowledge economy", which is a prerequisite for radical innovation.[285] Knowledge economy is an economic configuration,[286] whereby knowledge is valued as a key factor in production.[287]

Therefore, the economic growth in leading world economies is increasingly based on knowledge. This is in addition to tangible assets, such as capital and labour.[288] The momentous shift to knowledge-based economies in the 21st century has also caused a massive pressure on cities in the world. This pressure allows cities to see themselves in the global competition; for example, cities engage themselves in attracting talent globally and this poses a huge challenge to the cities.[289]

This shift to a knowledge economy is extremely vast and fundamental. It causes some observers to view the economy as based on knowledge, rather than traditional forms of capital and labour. Therefore, this could be regarded as a challenge to the fundamental tenets of capitalism.[290]

The importance of the knowledge economy means that the increase of globalisation and knowledge economy presents real opportunities to cities. It also means that cities need to understand why they matter in the knowledge economy. They can enable companies to respond innovatively to changing markets and can consider what policy interventions can be undertaken to affect what a city offers to businesses and its inhabitants.

There are two main reasons why cities matter in the knowledge economy and in the globalised economy. First, they offer productivity benefits, including access to markets and a variety of external economies of scale, including access to large and specialised labour pools, particularly of highly skilled workers. Cities also offer close proximity to other knowledge workers, enabling tacit knowledge to be shared - the knowledge that cannot be easily codified

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[285] Yeo B J K, 2010, pg 72

[286] In this configuration, knowledge is considered to be the key factor in production, and knowledge is also an important source for continuous improvement in the quality of goods, services and processes

[287] Yeo B J K, 2010, pg 71

[288] Yeo B J K, 2010, pg 71

[289] OECD, 2003, (http://www.oecd.org/document/03/03343,html accessed on 04-10-2009)

[290] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

and is best exchanged and developed through face-to-face contact and trust-based relationships. They offer a critical mass of firms, who interact through staff movements, networking and personal relationships. This allows the firms to benefit from spill-over effects from their innovative activity. These spill-over effects are particularly important in the knowledge economy, as they can significantly contribute to companies' ability to respond innovatively to changing markets.

The second reason is that cities have to offer access to a rich variety of goods, services, cultural facilities and social opportunities in the era of knowledge economy. Research suggests that the benefits of living in a city can be attractive for the most talented and skilled workers[291] who drive the knowledge economy. This means that knowledge workers gain access to a range of employment options, giving them incentives to develop specialised skills. This clustering consumption of services also supports innovation and enables the providers to have a better understanding of the changing markets.

Across the OECD member countries, there is a growing recognition that cities offer these production and consumption benefits, and that they are both engines of the knowledge economy and innovation to offer a high quality living environment.[292] This does not mean that the problems, which the post-industrial cities have been grappling with in the recent decades have gone away, but the cities continue to be the sites of some of the most profound social problems and highest levels of poverty in OECD countries.[293]

The importance of responding rapidly to changing markets means that globalisation is still an ongoing process, rather than a stage that has been reached, and it also means that globalisation remains place-based.[294]

Despite the increase of international flows, most companies manage their complex processes to disperse money, products and information by having a specialised command centre based in one country and often in one city.[295] Sassen argues that:

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[291] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

[292] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

[293] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

[294] Sassen S, 2006, pg 69

[295] Sassen, S, 2006, pg 70

This is the role of global cities, such as London, New York, and Tokyo, where many companies base their global operations because of their connectedness, access to talent and the increased ability of companies to respond quickly to changing markets.

This place-based element to globalisation is rarely discussed, but is very apparent upon a closer examination of successful companies. For example:

- The hugely successful clothing company, Zara, sources half of its products from trusted local suppliers located in and around its base in La Coruna;
- Ford insisted that suppliers were physically close to its new flexible factory in Chicago in order to manage its supply chain more effectively;
- Despite the higher costs of Italian wages, Benetton, Safilo, Max Mara, Tie Rack and Ermenegildo Zegna are globally recognised companies with production bases in Italy, They form a small-firm cluster whose collective output and profitability support trade fairs, design schools, training and information about the foreign markets, all feeding back into their firms' productivity.

Cities therefore matter in the globalised economy, as basing functions where in particular places help companies to respond to changing markets innovatively, as well as to manage costs where appropriate.[296]

Innovation is related to the cities, because the term "innovation" refers to both radical and incremental changes in thinking, in process and, in service, leads to novel processes, products and services on a global scale. Cities have unique characteristics that make them the most likely sites for innovation, because of their functional urban economy (as they are economic entities). It has been mentioned in chapter two that the economic prosperity of a country starts in the cities and spreads down to local governments.[297]

Cities provide an ideal environment for innovation, because they offer proximity, density and variety. The challenges of today's businesses are becoming increasingly complex, which makes it difficult for managers to manage the organisations and cities. They need innovative solutions to stay competitive. This can be attained by means of moving beyond current business practices to find new ways of doing business that will help to ensure future

[296] Sassen S, 2006, pg 70

[297] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

success.[298] For example, the challenges that face South Africa's cities and their local governments need real innovation. The evidence is based on riots, strikes, and protests all over South Africa. This shows that there is a strong lack of service delivery that the citizens must receive, which is caused by a lack of innovativity within South African cities. Take, for example, the city of Mthatha, where there are five layers of economy, but, from the current existing type of economy, the city's management is struggling to work out how to make the city prosper. Cultural planning can be used to meet its urban challenges that will also conserve the indigenous knowledge systems (IKS) within the city.

For cities to overcome the challenges outlined in chapter two, they must be innovative enough to deal with the challenges of the 21st century. They must be innovative on a regular basis, and must acquire a strong internal knowledge capability by means of a qualified workforce and management that is devoted to innovation.

In the literature of management, it is widespread that innovation is the central capability for all organisations that are interested in maximising their opportunities for success in the 21st century.[299] To maximise opportunities for success in this century, cities must pay attention to what is happening in the outside world as regards changing markets.

It has been discovered that knowledge fuels economic growth and social development in every region of the world. The forces of globalisation, such as migration, travel, trades, foreign investment and communications, speed up the dissemination and use of information across boundaries. New ideas and innovations are speeding faster than ever. Knowledge-based growth and development offer opportunities for both developed and developing economies.

It has been recognised that complex systems exhibit phenomena of non-linearity, instability, fractal??? structures and chaos phenomena that are intimately related to the general sense of life and urbanism.[300]

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[298] "There is nothing that is a more certain sign of insanity than to do the same thing over and over and expect the results to be different" - Albert Einstein, quoted in *How to think like Einstein*

[299] De Cagna Jeff, 2007, pg 2

[300] OECD, 1996, (http://www.oecd.org/document/96/03343,html accessed on 04-10-2009)

4.3 Conclusion

The assumption that innovation is a necessary activity in the cities is because cities that are influenced by economic factors are prominent centres of trade, finance innovation and markets, due to population dynamics, increase in urbanisation, the proximity volatility of markets and density.

The analysis suggests that both the knowledge economy and innovation happen in places, and cities provide the nodal points where these processes interact. Since knowledge is the most important source for radical and incremental innovation, it allows the city to interact with the global knowledge economy, because knowledge economy relies on diffusion of knowledge.

This means that innovation and the knowledge economy offer huge opportunities for cities. Successful cities will be those that recognise these opportunities and rise to the challenges of a shifting economy, building on their strengths and adapting to changes.

Therefore, there is a relationship between innovation and the cities in the era of the knowledge economy. This relationship promotes cooperation within the city to achieve an innovative city culture.

Based on the above analysis, it has been postulated that an innovative urban culture must have at least the following aspects and policies: urban hubs, local links, cultural planning and the triple helix (see sections 5.2, 5.3, 5.4 and 5.5).

4.4 Chapter Summary

This chapter focused on exploring the relationship between innovation and cities in the knowledge economy. Section 4.1 summarised the main focus of the research and the research strategy used, employing main sources. Section 4.2 unpacked the relationship between innovation and cities in the era of knowledge economy. Lastly, section 4.3 outlined the concluding remarks on the chapter.

Chapter five

Innovation and the City - the Triple Helix

5.1 Introduction

The objective of this thesis is to elucidate the relationship between innovation and cities in the era of knowledge economy. In this context, innovation is regarded as a process, and cities as the prime centres that facilitate this process in a knowledge economy. For this purpose, the researcher conducted a conceptual study, which entailed critically analysing and reviewing the literature on innovation, cities, and knowledge economy, in a manner that incorporates multiple views from different authors.

Based on an analysis of this study, it is postulated that an innovative city's culture will contain at least the following aspects: urban hubs, local links, cultural planning and the triple helix (see sections 5.2, 5.3, 5.4 and 5.5).

This chapter is divided into five major parts, where, in section 5.1, it explains the purpose of research, methodology, and chapter structure. In section 5.2, the chapter reviews the reason why cities should focus on "urban hubs"; in section 5.3: "local links"; in section 5.4: "cultural planning"; and in section 5.5: the "triple helix." Furthermore, it looks how cities can make use of these aspects and policies to thrive in the knowledge economy, while assessing the different roles of the OECD countries, national governments and cities. Finally, section 5.6 presents the concluding remarks of this chapter.

The literature on the increasing globalised nature of innovation is enormous. However, less work has been done on the spatial aspects of innovation - an important dimension of the

globalisation process.[301] This is because innovation activities, personnel and expenditure tend to be geographically concentrated or clustered.[302] It is also because certain geographical areas tend to be associated with significant levels of innovation activity and success, such as Silicon Valley for semiconductors, London for hedge funds, or Paris for fashion.[303]

There is a perception that some cities are more innovative than others.[304] Policymakers have long been concerned with finding the reason. Unpacking this problem requires considerable efforts, since cities are complex systems. They are hosts for innovation, which comes from the people, firms and organisations within the city. This means that cities often support innovation directly and indirectly.

From time to time, some of the most important things that they do are not at all regarded as innovation policy. This chapter presents an initial consideration and analysis of which particular urban features, processes or assets may be important to enable, sustain and promote innovation.

Drawing from theories and the evidence are two main ways to explain why firms' location in cities may help the innovation process.[305] One explanation relates to a city's scale, such as the size of its markets and its asset base.[306] Another explanation relates to how cities facilitate the proximity, networking and knowledge exchange.[307] We have dubbed these explanatory frameworks into urban hubs and local links respectively; these frameworks are innovation aspects of the city. There are two specific components within each aspect of innovation, i.e. urban hubs and local links.[308] For example, urban hubs consist of market and asset components; and, within local links, there are two components: those of institutions and networks.[309] Working across urban hubs and local links forms the key actor in innovation within cities.

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[301] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 1

[302] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 1

[303] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 1

[304] Kelly P Ruth and Ratcliffe S John, 2006, pg 46

[305] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 1

[306] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 1

[307] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 2

[308] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 3

[309] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 3

5.2 Urban Hubs: The Asset Base and Markets

The urban hubs approach is one that considers cities' market size and asset base, which are critical for supporting higher levels of innovative activity within the city. The urban hubs model draws heavily on the notion of urban economy. In cities, the model's components, i.e. the asset base and markets, help firms to be innovative as businesses. For example, they can select the optimal mix of suppliers and workers to meet specific customers' needs.[310]

In terms of assets, good transport infrastructure and services provide the accessibility and proximity that are essential for market access and for doing business. Proximity has been found to be important for innovation in all the urban case studies and sectors surrounding cities.[311] For example, the city of London has a huge advantage regarding fashion designers, as they have an international transport hub for travelling to suppliers and markets. Designers need to have regular access to international customers and suppliers.[312]

The concentration of skills, firms and institutions within cities also facilitates firms' easy access to their daily businesses. Most sectors and their innovating firms require a maximum of approximately one hour's travel time to suppliers, markets and to an international transport hub. The case studies suggest that transport infrastructure has been regarded as the major physical asset for facilitating business connections, networks and knowledge transfer.[313] For example, one of London's big advantages to fashion designers is the role of the international transport hub. Designers need to have regular transport to international customers and suppliers. They also need to attend fashion events elsewhere in the world. Hence, London's international transport connections make it an ideal location for businesses that need this kind of regular access.

Good local and regional transport networks allow easy, fast and reliable market access. It has been common for large companies located in the area to do business with other large firms in nearby locations. For example, they can outsource innovation or develop new business models; another key asset for firms is the availability of a pool of skilled labour, which also helps to support innovation. Universities must continue to supply skilled graduates to fill the

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[310] Summie C, 2004; "This 'pick and mix' economy of major cities such as London helps explain the concentration of innovative firms in and around the capital." Pg 228

[311] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 13

[312] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 13

[313] This is a huge problem of South African cities; for example Mthatha and East London, as articulated in chapter two.

need for more expert skills that the labour market requires. For example, the city of Mthatha can make use of the skills that come from the University of Walter Sisulu (previously known as University of Transkei).

Here is an example: an East London fashion designer, who did not study fashion design at university, became a designer because of his passion. He was guided by his mother at an early age (grade 4), and never looked back. "I followed in my mother's footsteps, as she had already established herself as a fashion designer and I took over," he said.[314]

In East London, he has been running his business over the past four years. He specialises in wedding dresses, ethnic and Afro-centric wear and school wear, and loves blending traditional wear with Western wear. The challenges that are being faced by most fashion designers in East London are a lack of availability of new garments' raw materials. Designers need to travel to other provinces, like Gauteng or KwaZulu Natal (KZN), to reach suppliers of raw materials. Another challenge is the competition among other designers within the city of East London.[315] This example illustrates the importance of transportation to and from the suppliers and markets. It also illustrates the importance of skills that need to be developed. The developed skills will work within the sector of fashion design to make the city of East London innovative.

Property and physical assets are important for specific sectors. It has been discovered that property and the built-up environment, e.g. office facilities and well-equipped business parks, have a direct impact on the ability to innovate. Among South African cities, Cape Town and Johannesburg are very strong examples. The physical layout of the business environment is a potential barrier to achieving high levels of networking and knowledge transfer.

Markets are vital for successful innovation. Research findings also demonstrated this.[316] An obvious advantage that cities offer firms is access to markets. Cities offer both large local markets and larger national and international marketplaces. City-based firms can pick and choose from a wide range of suppliers and sell to a wide range of customers in urban markets. Market access, repeatedly cited as an important location factor, can play an important role in sustaining innovative activities. Mthatha is a good example for the effects of the market scale, and this provides scope for innovation. The high demand for fashion designers, and size and

[314] This has been extracted from the article of Aretha Linden of *ECToday* newspaper, dated 05-05-2010

[315] This has been extracted from the article of Aretha Linden of *ECToday* newspaper, dated 05-05-2010

[316] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 14

diversity of this capital's market means that niche fashion designers have a local market. That is, the local markets are important to support innovative firms, who are found to be more likely to be serving national markets, as compared to other firms. The most innovative businesses make use of the ease of a local urban connectivity to operate in larger national and global arenas.[317]

5.3 Local Links: The Role of Networks and Institutions

Local links bring innovation to sectors that small firms and individuals dominate.[318] These sectors have a tendency to be disaggregated with regard to business functions[319] and they can involve several organisations. Cities display both strong and weak local links. This is noticeable in various neighbourhoods or districts. The degree of linkage depends on the type of industry. An urban sector with weak local links has a less dense network.

The local links within the cities must have clear objectives, with consensus about what the links are for, and how they will work. At a local level, this might be about identifying mutually beneficial collaboration on specific issues in order to respond to economic and social changes - for example, the transport infrastructure, a shared labour market pool or a shared retail centre.

Physical proximity allows firms to be more established with knowledge networks. This can happen within a given sector or between businesses and public institutions. Proximity encourages knowledge spill-overs and helps organisations to collaborate, for example on new ideas, shared standards, skill requirements, or buying raw materials for sewing. Proximity also helps to create a shared sense of identity that connects various players in a community, like social networks. For example, the social networks around the Grosvenor area, Mthatha's CBD, where the group of Pakistanis trade together within the same cluster.

Urban assets and institutions help businesses and knowledge networks to develop by reinforcing the role of urban markets. This happens by encouraging local proximity and, over time, helps clusters to form. These networks are often said to be essential for firms to develop new ideas, to turn these into innovative products and services, and to distribute them to markets.

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[317] Refering from chapter two, City of Mthatha is not doing that

[318] For example, the informal sector which consists of small firms from Mthatha (in chapter two)

[319] Refer to chapter two

Most cities have formal and informal networks that help to enable the flow of knowledge between enterprises located in the city.[320] For example, a city might choose to have respected academics sitting on their board for their expertise and to lend credibility to the firm, as they often need to access expert academic knowledge to help them overcome problems in product development as they arise. Both informal and formal businesses can make use of business links to develop the exchange of knowledge and ideas on commercial strategies. They also form research and development institutions. Firms communicate with one another through workshops and collaborative groups facilitated by the Chambers of Business. They do this by means of existing contacts and friendship networks. Urban location helps all firms to develop local supply chains that are part of both the local market for a sector or innovation, and the basis for business networks.[321] Supply chain relationships were considered essential for innovative transactions. In most cases, firms also wanted to develop more proactive knowledge networks that share ideas and collaborate.

Public and private institutions are mostly located in cities, where universities are key institutions to enable innovation. They play several roles, for example, the first of which are the sources and main drivers of commercial innovative potential.[322] The second role is to facilitate networks and be a hub for networking, collaboration and knowledge exchange.[323]

Local links in the economic developments and regeneration agencies play a broad range of roles to enable and support innovation and enterprise developments.[324] They champion innovative sectors and raise their profiles, as well as try to ensure that other public services and policies help their developments. These agencies are heavily involved in property, land, and the built environment that develops science and technology parks, and helps to innovate sectors with their property needs. They often situate incubation or advisory facilities alongside science and technology parks.

Finally, development agencies provide assistance to facilitate and establish networks within the city and undertake initiatives to ease barriers to growth and development in innovative SMEs by addressing skills shortages or providing access to finance.

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[320] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 15

[321] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 14

[322] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 15

[323] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 15

[324] Glenn A, Nathan M, Webber C, and Mahroum S, 2008, pg 13

5.4 Cultural Planning in the City

Cultural planning is a process of implementing cultural policy, regeneration of projects and cultural diversity programs. It links all cultural activities with human development and community development.[325] Cultural planning is developed in the people, not for them.[326] For a better understanding of cultural planning, it is imperative to describe culture. Culture is an intrinsic part of humans to operate in their surrounding world; for example, how humans live, e.g. economically, socially and politically within the particular society. This includes the following six cultural institutions: arts, technology, economy, family structure, polity or governance and ideology, religion or *ukholo lwemveli*.

Cultural planning can be one of the urban innovative aspects, and these institutions guide innovation within the city. For example, cultural planning contributes to arts as an intrinsic part of the way humans operate in their world,[327] thereby focusing on cultural identity, innovativity, creativity and the globalisation of culture. The planning process is implemented as an integrative strategy for community development.

Therefore, cultural planning is an engine for community development, which is essential in South Africa, due to the broad definition and importance of cultural planning, with regard to the status of South African cities, particularly Mthatha and East London (Buffalo City) in the Eastern Cape Province.

This term "cultural planning" has been conceptualised as a field of public enquiry, discovery and intellectual cross-fertilisation.[328] However, Stevenson describes the conceptualisation of cultural planning: as "a way of fostering local cultural diversity, community development and partnership between public, private sections as well as positioning the arts as an industry".[329]

But Stevenson observes the following regarding cultural planning:

> At a national level, cultural policy continues largely to be concerned with elite art forms, including supporting many high-profile arts institutions and organisations, or

[325] Stevenson D, 2004. She also elaborates that cultural planning focuses on the local; and debates and prescriptions developed in terms of the nation take on very different and quite idiosyncratic complexions. Indeed, cultural planning is fundamentally about cities, towns, neighbourhoods and local communities. In other words, it is about places… my flat, street, city, region and country, even if I see myself as a citizen of the world. Pgs 121, 124

[326] Schorgal T B, 2006, pg 2

[327] Bamford A, 2006, pg 19

[328] Sirayi Mzo, 2008, pg 334

[329] Sirayi Mzo, 2008, pg 334

> with film and media policy… Although the charter of national cultural policy is to ensure that the nation is able to represent itself to itself and to the world, it has been responsible for nurturing (regulating) everyday ways of life to the same extent as local government and it has a relatively small part to play in dealing with cultural activity as it is lived on the ground.[330]

Although this observation of Stevenson is based on Western European countries, it holds true for the South African context.[331] South Africa's national cultural policy is concerned primarily with high-profile arts, cultural institutions, and elite art forms and gives only lip service to indigenous arts forms, townships and rural areas.[332] In fact, the South African constitution demonstrates this elitist model and states that the "Parliament and provincial legislatures have concurrent legislative competence in functional areas of cultural matters."[333] For example, it has been noted that the Department of Arts and Culture has been concerned with a national cultural policy that promotes elite art forms, and supports high-profile cultural institutions.[334] The above example is illustrated by the Johannesburg City Council, which works in partnership with Gauteng Agency Blue IQ through the Johannesburg Development Agency (JDA) that is committed to ensuring that Newtown thrives.[335] Newtown is one of five tourism developments (like Kliptown, the Cradle of Humankind World Heritage Site, Dinokeng and Constitutional Hill) aimed at inner-city regeneration.[336] Through their investment in development, the JDA aims to attract retail and commercial business back into Newtown.[337] Existing alongside office workers, the JDA also wants to promote restaurants, events and attractions that will boost the area for foreign as well as local visitors.

The Newtown project, with four other projects, i.e. Constitutional Hill, Kliptown, Dinokeng and the Cradle of Humankind World Heritage Site, are in a process to make a difference to Johannesburg's inner-city in terms of rejuvenation. A JDA commissioned audit of the city's cultural assets assessed their potential as elements of a measured strategy to deliver real

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[330] Sirayi Mzo, 2008, pg 336

[331] Sirayi Mzo, 2008, pg 336

[332] Sirayi Mzo, 2008, pg 336

[333] Constitution of the Republic of South Africa, schedule 4, 1996

[334] National Heritage Site in Pretoria, Cradle of Humankind World Heritage Site, Constitutional Hill in Johannesburg, Nelson Mandela Museum in Mthatha

[335] Sirayi Mzo, 2008, pg 341

[336] Sirayi Mzo, 2008, pg 341

[337] Sirayi Mzo, 2008, pg 341

cultural strength to the heart of the city;[338] yet, the absence of a cultural planning approach is noticeable. For example, cultural planning is referred to as "the theology of a community and a street,"[339] not this elitist model that is currently taking place within the city of Johannesburg. The South African government has attempted to eliminate the practice of departmentalisation.[340] They tried to be more corporate by using integrated development planning (IDP).[341]

5.4.1 Is Cultural Planning an Innovative Aspect?

As regards the definition of cultural planning, it explains that cultural planning is a process that assists municipalities and communities to develop cultural industries. It also focuses on plans that affect the quality of life for the people in the cities. Researchers on cultural planning unanimously agree that cultural planning can foster holistic community development.[342] Stevenson elaborates that this first appeared in print when, in 1979, the economist and town planner, Harvey Perloff, recommended cultural planning as a way for communities to identify their cultural resources for the achievement of artistic excellence and community development.[343] It has recently become more sophisticated with the generation of scientific literature produced and applied by many communities in Europe, Australia and the United States.[344]

The South African government has attempted to eliminate the practice of departmentalisation or stand-alone planning that moves towards more corporate and integrated development planning (IDP).[345] South African city managers have not noticed that IDP does not work for them,[346] instead they should try to use cultural planning.

Cultural planning is different from IDP in several aspects. For example, cultural planning is a public process, and is led by a citizens' steering committee that has been appointed by the

[338] Stark P, 2001, pgs 19-46

[339] Sirayi Mzo, 2008, pg 336

[340] Ministry of Provincial Affairs and Constitutional Development, 1998

[341] Sirayi Mzo, 2008, pg 334

[342] Dreeszen C, 1998 contends that the term cultural planning originated in 1979. Pg 2

[343] Stevenson D, 2004, pg 121

[344] Sirayi Mzo, 2008, pg 334

[345] Ministry of Provincial Affairs and Constitutional Development, 1998

[346] For example, all the cities in South Africa are flat as regards service delivery to their residents

local government.[347] Cultural planning turns culture into an engine for social, economic, and physical regeneration. It also contributes to increased understanding of the dynamics of the metropolis. Furthermore, Dreeszen describes the importance of cultural planning, as follows:

> The effect of cultural planning in the community increases, improves programs and services in response to identified needs like improvement of communication and cooperation between different groups in arts; integrating arts better into the community; increases both visibility of artists and arts organisations; improves civic community's awareness of the potential of arts and culture to contribute to community and economic development; improving public access to the arts and increases the audience base for arts activities; also improving arts facilities and increases or sustains the level of public and private funding for the arts.[348]

Cultural planning promotes tools for communication and also teaches effective communication. This is important for South Africa, as it is part of the global village. It will require a very good understanding of technology as a principal medium of communication within the city and its municipalities. For example,

> A costly information technology system, on which government spent part of a R25 million allocation to improve the daily running of municipalities, is gathering dust, because officials were not trained to use it.
>
> The system was installed between 2003 and 2005 by the AloeCap (Service Provider). But officials, that it was intended for still had no clue how to use it by last year. It was meant to assist in the monitoring of municipalities and provide an early warning on emerging problems to enable the department to intervene.[349]

Therefore, this lack of knowledge, information, training and willingness has left municipal and city officials clueless. They cannot use the installed program which was intended to monitor problems within the city and its municipalities. It has been argued that, in the knowledge society of the 21st century that is dominated by information and communication technology (ICT), the municipality and city officials need to be trained to implement the available ICT which is at their disposal. This can cause a change in labour-market demands, and cultural planning could play a significant role in this regard. For example, it could

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[347] Sirayi Mzo, 2008, pg 334

[348] Sirayi Mzo, 2008, pg 337

[349] Mataboge M, 2010. "Costly IT system stands idle". *Mail & Guardian*, April 01 to 08 2010, (pg 11)

provide an avenue to preserve and make use of indigenous knowledge systems within the city.[350]

To illustrate this further, the example of the city of Birmingham, England, is presented.

> This city offers an excellent example of culture-led urban renewal. Birmingham City was in a state of decline and degeneration in the late 1970s and early 1980s. During this period, the city lost nearly 200 000 manufacturing jobs, and unemployment went up to 20%. No one wanted to visit the city centre at that time, as there was no civic pride. However, after the Labour Party took over in 1984, the Birmingham City Council adopted a cultural-led urban regeneration approach. The development started with Digbeth, which was a district marked by empty warehouses and industrial buildings. After this initiative, the media-related businesses moved into the district. This district became known as Media Zone at a later stage.
>
> The second initiative (next stage), was the areas around the international convention centre (ICC), which was opened in 1991. The aim was to improve the ambiance of the city centre. This should regenerate the Birmingham's image as an international business destination. A new concert hall for the City of Birmingham Symphony Orchestra was also included in the ICC. The council launched new festivals focusing on jazz, literature, cinema and TV, which attracted prestigious arts organisations and thereafter decorative arts and sculpture boomed. The four districts around the ICC, the Media Zone in Digbeth, China Town, crafts based Jewellery Quarter that houses both businesses and residences, and the theatre and entertainment district are distinctive features of the city.[351]

The city of Birmingham was improved through the transformation of low-rent areas. They did this through gentrification and affordable houses that were built for residents in Birmingham. This involved community development strategies, individual needs, and networks among the residents of the city. Therefore, the cultural planning approach was guided by the concern for social inclusion and empowerment. The restaurants, bars and other businesses (e.g. the SMMEs) were built, which supported the infrastructure for low-income earners.[352]

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[350] Bamford A, 2006, pg 126

[351] Sirayi Mzo, 2008, pg 340

[352] This does not happen in South African cities; for example, the city of Mthatha, and implementing this kind

5.4.2 The Requirements for the Success of Cultural Planning

The success of cultural planning, as a process for social and economic development, city marketing and physical regeneration depends on a number of preconditions and different local contexts. These preconditions are the government's (city managers') attitude and level of autonomy. The local context consists of the size and nature of the local market for cultural activities.

With regard to the government's attitude, the city should adopt the broadest understanding of culture and must regulate cultural planning as a planning tool. They can also integrate it into other development policies. If the city adopts cultural planning as one of its planning tools, then more results will be realised at local level due to the culture-led social, economic and physical development approach.[353]

The success of cultural planning depends on the autonomy of the city or local government. The notion of autonomy implies that the financial resources, powers and statutory responsibilities reside within the city or local governments. Cities that are responsible by financial statutory, have a better chance to influence the cultural planning processes. Indeed, cultural planning is more stable in cities where cultural expenditure is the statutory duty of a local authority.[354]

The scope and ambitions of cultural planning are influenced by the size of the local market for cultural activities. This, in turn, relates to the social and educational profile of urban populations whose level of arts education plays a huge role. To raise arts education, local universities should use a broad-based approach to arts education that includes heritage, cultural management and policy, culture and urban regeneration, culture and rural development, cultural planning, culture and economic development or creative economies, citizenship and immigration, management of cultural diversity, management in entertainment, cultural law and arts education pedagogy and preparation of teachers.[355]

The degree of commitment of the investor class developers, hotels, malls, national and international companies, is crucial to the city. Furthermore, collaboration and intellectual

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of approach (cultural planning) over economic problems (their layers of economy) which are described in chapter two. Surely this approach might bring remedy and hope for the residents of Mthatha

[353] Sirayi Mzo, 2008, pg 334

[354] Sirayi Mzo, 2008, pg 334

[355] Sirayi Mzo, 2008, pg 335

cross-fertilisation among academics, the community, industry and governmental sectors must be encouraged.[356] The academic sector, with its competencies in the application and refinement of conceptual frameworks and methodologies, is best suited to facilitate cultural planning processes. The community sector can provide all the necessary local knowledge; the industrial and governmental sectors should be furnished with departmental objectives and legislative powers and resources for planning and implementation beyond those of other actors.[357]

The extent to which different municipalities have been influenced by regeneration strategies of other cities also contributes to the rejuvenation of cities; the European, American and Asian models may have a positive influence if properly applied to South Africa.

In conclusion, cultural planning is essential for cities that are in distress, warring communities, declining cities, dilapidated settlements, remote villages and inaccessible mountainous areas. Cultural planning is a powerful tool, with which communities are built, constructed and reconstructed.[358] For example, many researchers have argued that cultural planning helps to maintain the vibrancy of city centres and the process of urban renewal and contributes significantly to improving a city's image.[359] Schorgal elaborates that cultural planning helped to turn North-eastern Ohio into an exciting place.[360] Cultural planning was the most critical requirement for sustaining cultural institutions and improving people's quality of life, as it also strengthened education for citizens of all ages and contributed to North-eastern Ohio's social and economic wellbeing.[361] The creative Columbus Policy Steering Committee agreed that cultural planning was long overdue as a process to transform Columbus into a vibrant city where people want to live and work.[362]

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[356] This is a quadriplet helix model

[357] Sirayi Mzo, 2008, pg 337

[358] Sirayi Mzo, 2008, pg 338

[359] Sirayi Mzo, 2008, pg 338

[360] Schorgal T B, 2006, pg 2

[361] Schorgal T B, 2006, pg 2

[362] Stevenson D, 2004, pg 124

5.5 The Triple Helix Model

The triple helix is a spiral model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalisation.[363] Helix is a spiral structure[364] consisting of a complex entity constructed from many components or parts.

This sub-section offers a critical analysis of the triple helix model as a basis for an urban innovation system and is based on the conceptual and theoretical analysis regarding the triple helix model as an innovation system. As the demands or challenges of the cities in developing countries continue to increase a strong need, therefore, arises to use this innovation system.

The discussion will be based on the essential stages required to establish a robust synergy between the three different actors, the university, the industry and the government, alongside the local South African context.

5.5.1 Background Understanding of the Triple Helix Model

The triple helix model emphasises relations between the university, industry and government in innovation and technology extensions, and plays a central role for innovation in firms within the city.[365] This model was formed for the purpose of introducing new ideas and formats for high-tech development.[366] It consists of three dimensions of technology (or knowledge) transfer that are as follows: internal transformation, where each of the helices consider development of lateral ties among companies through strategic alliances to imbue the universities' economic development mission; secondly, putting influence in one helix upon another; thirdly, creating trilateral networks and organisations from the interaction among the three helices.[367]

The triple helix model is mainly organised in three parts: institutional transformation, evolutionary mechanisms and a second academic revolution.[368] Firstly, in consideration of institutional transformation, a strong impact of new technologies is emerging unavoidably,

[363] Etzkowitz Henry, 2002, pg 2

[364] Hornby A S, 2005, pg 696

[365] Tu J, Gu S and Wu G, 2005, pg 159

[366] Tu J, Gu S and Wu G, 2005, pg 159

[367] Tu J, Gu S and Wu G, 2005, pg 159

[368] Tu J, Gu S and Wu G, 2005, pg 160

and leads to increasingly complex innovation processes for complex institutional infrastructure, as well as human capital.[369]

Secondly, the mechanisms for transformation are characterised by evolutionary factors. For example, the overlapping of three institutional spheres involves knowledge spaces, space for consensus and innovation space. Therefore a fully developed triple helix will be composed of all of these spaces (see Table 1 on page 84).[370]

Thirdly, the second academic revolution emphasises the university's multiple role in the regional economy.[371] Universities are expected to produce resources and knowledge through research and development for the entrepreneurial and commercialisation of industries to contribute to knowledge-based regional development.[372] For example, in the case of China (in the Baoji city) universities helped companies to identify and design fertilisers and insecticides to improve their agricultural production for the market.[373]

The phenomenon of the triple helix system has also been recognised widely in developed countries.[374] It has emerged from the needs of universities to work closely together with industries in order to improve the knowledge spill-overs.[375] It also maintains the sustainable development of the integration of industry and university.[376] Moreover, it is important for government to support this synergy, as it will play the role of policy-making and provide the necessary tools to encourage the local region. The tools could be based on innovate policies or on incentives for the universities and industries to develop their research and development activities.

However, the new triple helix paradigm has been recognised as a new concept for some developing countries. Although they have developed this kind of joint partnership in the 1990s,[377] progress has been considered to be relatively slow compared with similar

[369] Tu J, Gu S and Wu G, 2005, pg 160
[370] Tu J, Gu S and Wu G, 2005, pg 160
[371] Tu J, Gu S and Wu G, 2005, pg 160
[372] Tu J, Gu S and Wu G, 2005, pg 160
[373] Tu J, Gu S and Wu G, 2005, pg 160
[374] Etzkowitz Henry and Leydersdoff Loet, 1997, pg 204
[375] Zucker L, Darby M and Brewer M, 1998, pg 291
[376] Zucker L, Darby M and Brewer M, 1998, pg 291
[377] Zucker L, Darby M and Brewer M, 1998, pg 292

partnerships in the US and some of the Western European countries.[378]

Government policy makers and economic development officials, especially in South Africa, have been trying to increase economic growth. The desire to increase employment and taxable income drives this, while innovation is the source of economic growth and prosperity. Government policy makers have determined that they can promote venture creation and innovation on regional bases as a solution to unemployment or reduced tax revenue. The fundamental idea is to establish new firms that will generate significant growth in higher salary employment. This perception also assumes that new firms should employ many people with skills. This is contrary to South African young entrepreneurs who have never succeeded in creating organisations; not even half of all potential founders have succeeded in creating an enterprise. Most firms start small, are short-lived or, at best, remain small.

Regardless of the problems encountered, public policy makers continue to seek economic growth by endorsing entrepreneurship and innovation.[379] To them, this is one of the few viable alternatives available with which to meet the policy maker's wish to increase employment. There obviously is a need to significantly increase entrepreneurial activity. Therefore, calls for some kind of mechanism to engineer the situation are needed. This mechanism is known as an innovation system, which is a prevailing model in many countries, especially in the Nordic countries that are known as triple helix models of the innovation system.

5.5.2 How the Triple Helix Model Works

In recent years, a number of concepts have been proposed for modelling the transformation processes in university-industry-government relations. For example, national systems of innovation[380] have been compared with regional systems.[381] From the networks' perspective, the governance level can be considered as variable. There were considerable debates, not only about the empirical basis of the triple helix, but also about its normative implications.

Three main forms (types) of the triple helix model were identified and are as follows: triple helix I, a *statist* triple helix in which the state encompasses academia and industry, and directs the relations between them.

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[378] Leydesdorff Loet, 2005, pg 2

[379] Braczyk H, Cooke P and Heidenreich M, 1998, pg 22

[380] Leydesdorff Loet, and Etzkowitz Henry, 1998, pg 197

[381] Leydesdorff Loet, and Etzkowitz Henry, 1998, pg 197

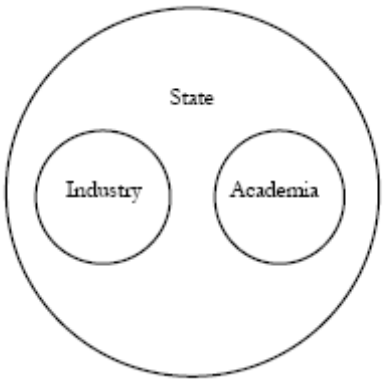

Figure: 3 Triple Helix I (known as *statist*)

Source: Etzkowitz Henry, 2002

The second, triple helix II, a *laissez-faire* triple helix, consists of separated institutional spheres, where government, university and industry operate apart from each other.

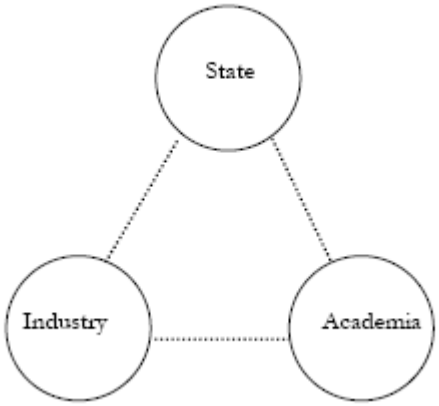

Figure: 4 Triple Helix II (known as *laissez-faire*)

Source: Etzkowitz Henry, 2002

The helices are defined as different communication systems that consist of the operation of markets, technological innovations, and control at the interfaces. Among these, the interfaces' different functions operate in a distributed mode that produces potential new forms of communication, as in a sustained technology transfer interface, or in the case of patent

legislation. In this model, the university provides basic research and trained people. It is expected that firms in an industry should operate completely apart from each other in competitive relationships, linked through the market. Government is limited to addressing problems, which can be defined as market failures, with solutions that the private sector cannot, or will not, support.[382]

The third, triple helix III, is an interactive model which consists of overlapping, yet relatively independent, institutional spheres.

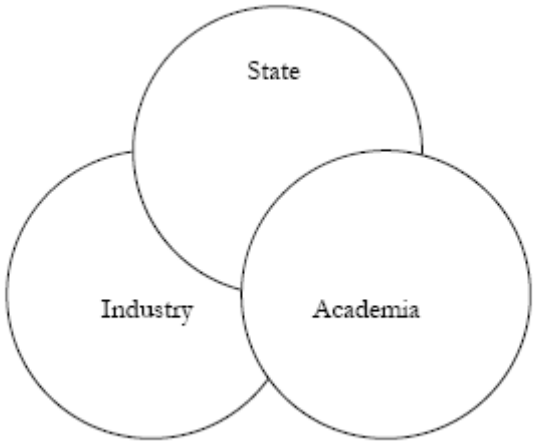

Figure: 5 Triple Helix III, (known as interactive model)

Source: Etzkowitz Henry, 2002

The institutional spheres of university, industry and government, in addition to performing their traditional functions, each assumes that the roles of others with universities create an industrial penumbra, or perform a quasi-governmental role as a regional or local innovation organiser.

The model is recursive, since triple helix II tends to produce an inner core of communicative overlap among the institutions of triple helix I, that can be institutionalised to a greater or lesser degree. However, the different versions of the triple helix posit different types of intersections among the institutional spheres with significant implications for both theory and practice. The institutionally defined triple helix is premised upon separate academic,

[382] Etzkowitz Henry, James Dzisah, Marina Ranga and Chunyan Zhou, 2007, pg 16

industrial, and governmental spheres and the knowledge flows among them. Transfer is no longer considered as a linear process from an origin to an application. Historical patterns of interaction can be reconsidered. The fully developed triple helix will comprise the following information (see the Table 1, page 84).

Table: 1 Conceptual framework for knowledge-based regional development

Stage of development	Characteristics
Creation of a knowledge space	Focus on "regional innovation environments" where different actors work to improve local conditions for innovation by concentrating related R&D activities and other relevant operations
Creation of a consensus space	Ideas and strategies are generated in a "triple helix" of multiple reciprocal relationships among institutional sectors (academic, public, private)
Creation of an innovation space	Attempts at realising the goals articulated in the previous phase; establishing and/or attracting public and private venture capital (combination of capital, technical knowledge and business knowledge) is central

Source: Etzkowitz Henry, 2002

It is useful to apply the example of two developing Asian countries, India and China, for a better understanding of how the triple helix forms an innovation system. The first example is India, where recently the South African delegation (a 40-member team) led by the Minister of the National Department of Rural Development and Land Reform, Mr Gugile Nkwinti,[383] attended an Annual International Rural Development Conference (ANIRDC) in New Delhi, India.. These forty people were Walter Sisulu University (WSU) delegate members. The conference brought together the emerging economies of India, China, Brazil and South

[383] From 2009, Mr Gugile Nkwinti has been the Minister of the National Department of Rural Development and Land Reform

Africa. The aim was to promote solidarity, especially the exchange of information regarding best practices in rural development in these countries. WSU members also spent some time at the Punjab Agricultural University (PAU) in the Punjab province, India.[384]

From Prof. N. P. Luswazi's report on the purpose of the visit to PAU during the ime of the conference, she highlighted Dr. Kirpal Singh Aulakh's speech as he addressed the conference as a keynote speaker.[385] "He enlightened conference participators on the role that agricultural universities have played in India, in the Green Revolution. He maintained that forty years ago the Punjab had been poorer than Transkei is today," she said[386]

Prof Luswazi also added that Dr. Aulakh also emphasised how a policy transformed the 39 universities in agriculture and led them to be partners.[387] These partners cooperated to bring the Green Revolution to the Punjab province and other areas of India. The role of the agricultural universities has been to produce high level scientists, agricultural managers and practitioners, as well as to conduct research that is relevant to the regional problems.[388]

Prof Luswazi believes that this can make an impact upon the Eastern Cape Province and beyond, only if they are able to share and infuse it into WSU programmes.[389] She concluded, "Exposure to these agricultural universities will assist WSU in its current big project of establishing a new Faculty of Agriculture and Rural Development Studies."[390]

The second example is China, which decided to take a transitional process from the planned economy to the market economy.[391] In the planned economy, the agro-technology extension system was under the control of local government (see the figure 6, page 86) and was a linear system.[392]

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[384] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010

[385] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010.

[386] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010.

[387] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010.

[388] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010.

[389] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010.

[390] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010.

[391] Tu J, Gu S and Wu G, 2005, pg 157

[392] Tu J, Gu S and Wu G, 2005, pg 162

To illustrate the second example, the city of Baoji was used. Baoji is located in Shanxi Province in the western part of China.[393] Baoji means Golden Cock, and it is the birthplace of the Chinese culture.[394] It is not a rich city and consists of nine counties and three districts.[395]

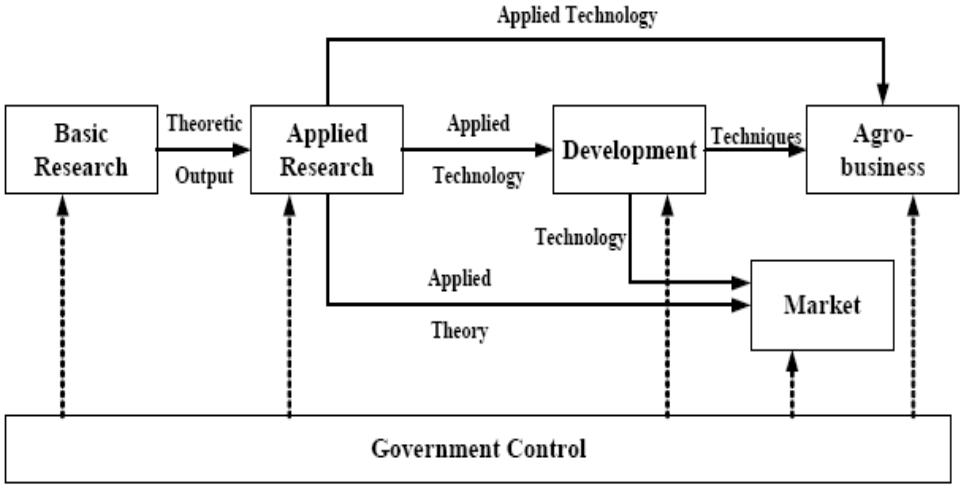

Figure: 6 The traditional Agro-technology Extension System- A Linear Model

Source: Tu J, Gu S and Wu G, 2005

Due to the impacts of market reforms, the former countrywide extension system was disassembled in many regions.[396] Because, there were no linkages within the agro-technology extension system, this made it extremely difficult for farmers to receive technical training.[397]

[393] Tu J, Gu S and Wu G, 2005, pg 165

[394] Tu J, Gu S and Wu G, 2005, pg 165

[395] Tu J, Gu S and Wu G, 2005, pg 165

[396] Tu J and Wu G, 2004, pg 64

[397] Tu J, Gu S and Wu G, 2005, pg 166

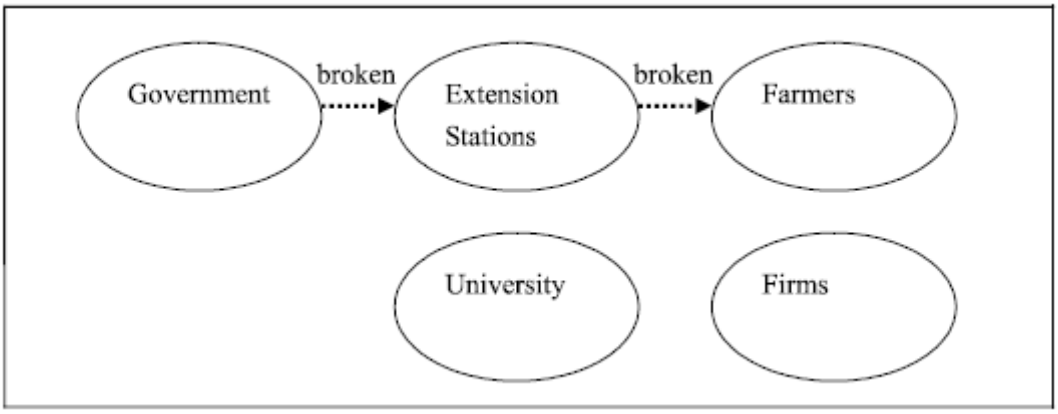

Figure: 7 Old Agro-Technology Extension Systems in rural Baoji

Source: Tu J, Gu S and Wu G, 2005

Therefore, the lack of agro-technology led to serious problems.[398] They lack modern planting techniques, because they continue to use their traditional ways of planting.[399] This is due to less training in basic planting techniques.[400] Since the government has been unable to maintain or develop the agro-technology extension system, the crucial question has been asked:

> Who will take the place of the public extension stations?[401]

Universities were expected to take up an advanced role in the new network of the regional agricultural innovation system.[402] Western scholars believed that universities should combine the missions of economic and social developments with traditional missions to become entrepreneurial and be called the second academic revolution[403] (see Table 2, page 88).

[398] Tu J, Gu S and Wu G, 2005, pg 166
[399] Tu J, Gu S and Wu G, 2005, pg 166
[400] Tu J, Gu S and Wu G, 2005, pg 166
[401] Tu J, Gu S and Wu G, 2005, pg 158
[402] Tu J, Gu S and Wu G, 2005, pg 158
[403] Etzkowitz Henry, 2003, pg 110

Table: 2 Expansion of university missions

Teaching	Research	Entrepreneurial
Preservation and dissemination of knowledge	First academic revolution	Second academic revolution
New missions generate conflict of interest controversies	Two missions: teaching and research	Third mission: economic and social development; old missions continued

Source: Etzkowitz Henry, 2003

After some years of chaos, new mechanisms of agro-technology transfer began to emerge.[404] During this transition, universities grew from strength to strength with regard to their research capacity in agriculture (see Table 3, below).

[404] Ministry of Agriculture in China, 2001

Table: 3 Agricultural research investments in China, 1953-1988

	1953-1957	1958-1969	1961-1965	1966-1976	1977-1985	1986-1987	1988
Research Personnel (in full-time equivalents)							
Scientists and engineers: (graduates or equivalent) Research Institutes	-	-	6,966	11,118	27,207	41,808	46,649
Universities	193	363	504	503	3,051	6,728	8,597
Total	193	363	7,669	11,621	30,257	48,536	55,246
Technical support staff Research Institutes	-	-	4,644	7,411	17,921	30,043	28,895
Universities	-	-	66	82	400	943	927
Total	-	-	4,710	7,494	18,320	30,986	29,822
Research expenditures (in millions of 1980 PPP dollars per year)							
Research Institutes	78,1	560,0	476,2	724,8	1,485,2	1,843,1	1,974,7
Universities	4,7	7,3	10,5	11,4	58,7	112,2	124,8
Total	82,8	567,3	436,2	736,2	1,543,9	1,955,3	2,099,5
Agricultural research intensity	0,007%	0,58%	O,41%	0,36%	0,41%	0,39%	0,40%

Source: Fan S and Pardey G, 1993

Notes: Current Yuan data were first deflated to constant 1980 Yuan using the national retail price index taken from China's 1991 Statistical Yearbook, then converted to purchasing

power parity (PPP) dollars, using Summers and Heston's 1980 PPP over the GDP conversion factor.[405]

One of the crucial symbols is that universities became more active than the state.[406] They provided the training to rural development areas in China[407] (see Table 4, below):

Table: 4 Ratio of technical personnel in rural population (%)

Year	1986	1987	1988	1989	1990	1991
Rural labour with good techniques	5,64	5,66	5,63	5,72	5,96	6,25
Rural labour received professional education or training	1,67	1,68	1,67	1,91	2,13	2,16
Rural labour with professional title	-	-	-	-	-	-
Year	1993	1995	1996	1997	1998	1999
Rural labour with good techniques	6,22	-	-	-	-	-
Rural labour received professional education or training	2,22	2,75	3,00	3,04	3,07	3,09
Rural labour with professional title	0,89	2,06	1,85	1,87	1,65	1,66

Source: Ministry of Agriculture of China, 2001

Note: The symbol '-'means no data.

After ten years of chaos in China, new mechanisms of agro-technology transfer began to emerge.[408] Private firms and universities played a significant role in agricultural R&D and technology transfer.[409] They also manage the collaborations with external knowledge

[405] Tu J, Gu S and Wu G, 2005, pg 162

[406] Ministry of Agriculture, 2001

[407] Tu J, Gu S and Wu G, 2005, pg 162

[408] Tu J, Gu S and Wu G, 2005, pg 163

[409] Tu J, Gu S and Wu G, 2005, pg 163

resources, including those embodied in university researchers.[410] Results were also evident in changes in the agro-sector regarding the traditional agricultural products which decreasing, while the new and high-yield varieties of food crops were being produced at an accelerating pace.[411] But, the situation of rural labour's access to training was very low with regard to improvement (see Table 4, page 90). Even where local governments do contribute to training, there is a declining trend[412] (see Table 5, below).

Table: 5 Training activities held by county government

Year	Training courses Number of courses	Participants	Establishment of rural technology association
1997	8,609	1,755,679	2,584
1998	12,861	1,941,153	3,328
1999	13,571	1,238,641	3,463
2000	9,973	851,961	2,447
2001	12,916	990,546	3,714
2002	13,395	942,466	2,137
2003	10,433	918,249	2,262

Source: Tu J, Gu S and Wu G, 2005. National Bureau of Statistics of China, 2002

The flowing of knowledge is tracked by scientometrics, which are an important constituent of science-based economic growth.[413] More intensive relations of increasing complexity have emerged in the course of the capitalisation of knowledge. The merging of Triple Helix III is

[410] Tu J, Gu S and Wu G, 2005, pg 163
[411] Tu J, Gu S and Wu G, 2005, pg 163
[412] Tu J, Gu S and Wu G, 2005, pg 163
[413] Tu J, Gu S and Wu G, 2005, pg 167

based upon a complex set of organisational ties among overlapping spheres that increasingly elude boundaries between them.[414] In addition to linkages among institutional spheres, each sphere is more and more able to assume the role of another. For example, the Baoji government established a group of necessary facilities[415] by, every year, inviting outside experts (from Northwest Sci-Tech University (NSTU) of Agriculture and Forestry, located in their neighbouring city, called Yangling,[416]) to a short stay in the rural regions of Baoji.[417] This was because there is no strong academic institution in Baoji.[418] The Baoji government invested in the building of courtyards - typical two-floored buildings that include a sitting room, bedroom, laboratory, computer room and other necessary equipment.[419] Normally, there was a certain amount of experimental field space that was also allocated in the courtyards,[420] where it was able to settle down with both research and living facilities.[421] Experts were willing to stay among the farmers for a certain duration of time every year.[422] They helped to train the farmers and introduced new breeds by making use of the experimental fields around the courtyards to do their researches.[423] Thus, the project led to an overlay of a trilateral network.[424]

[414] Etzkowitz Henry, James Dzisah, Marina Ranga and Chunyan Zhou, 2007, pg 16

[415] Tu J, Gu S and Wu G, 2005, pg 167

[416] Northwest Sci-Tech University (NSTU) of Agriculture and Forestry is the most important source of intllect in China

[417] Tu J, Gu S and Wu G, 2005, pg 166

[418] Tu J, Gu S and Wu G, 2005, pg 166

[419] Tu J, Gu S and Wu G, 2005, pg 167

[420] Tu J, Gu S and Wu G, 2005, pg 166

[421] Tu J, Gu S and Wu G, 2005, pg 166

[422] Tu J, Gu S and Wu G, 2005, pg 166

[423] Tu J, Gu S and Wu G, 2005, pg 166

[424] Tu J, Gu S and Wu G, 2005, pg 166

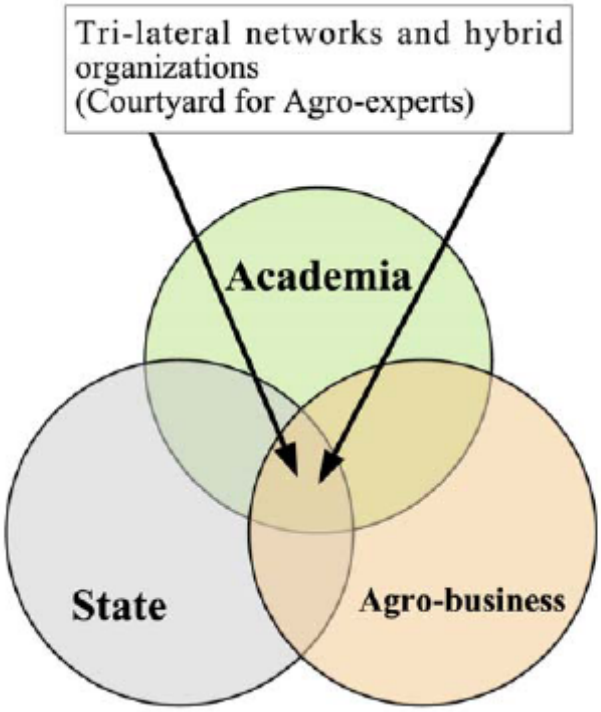

Figure: 8 Triple Helix Model of academy-agriculture-government relations

Source: Tu J, Gu S and Wu G, 2005

The courtyard for Agro-experts makes up for the divide between technology producers (the university) and technology users (the technical diffusion service, farmers, firms, etc.).[425] Thus, the integral system was activated. The technology was transferred through the crucial linkages.[426]

[425] Tu J, Gu S and Wu G, 2005, pg 168

[426] Tu J, Gu S and Wu G, 2005, pg 168

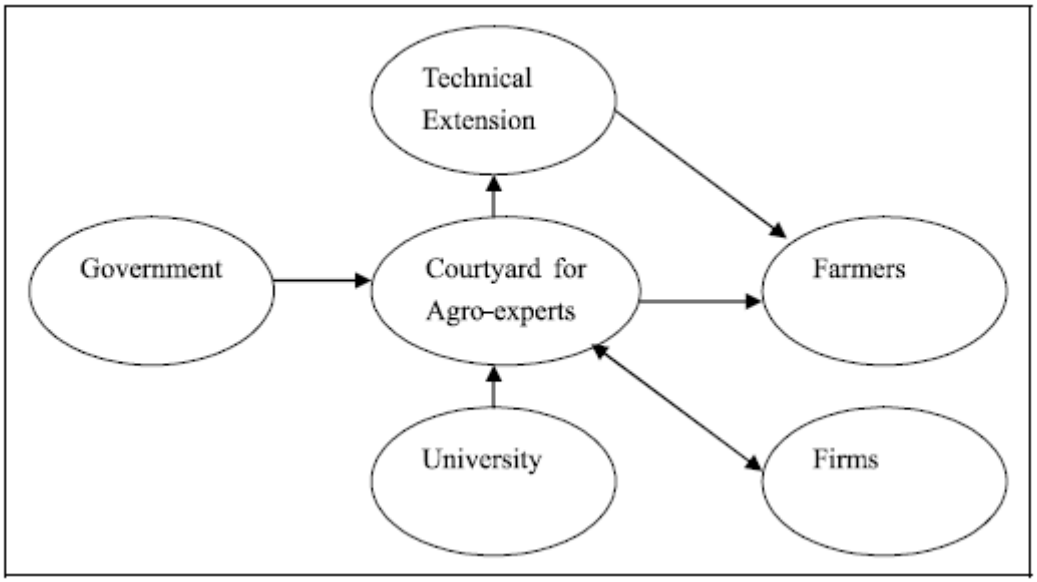

Figure: 9 Agro-Technology Extension System with "courtyard for agro-experts" in rural Baoji

Source: Tu, Gu and Wu, 2005

This amounted to a new agro-technology extension in Baoji (see figure 9 above).[427] Therefore, in this system, the government sets up the infrastructures of innovation, and helps to establish an innovative environment.[428]

Universities taught entrepreneurial tasks such as marketing knowledge and creating companies, while firms developed an academic dimension, sharing knowledge amongst each other and training employees at ever higher levels of skill.[429]

In conclusion, the agro-sector was regarded as an industry with high risk, long-term investment, high uncertainty and oceans of tacit knowledge which is difficult to diffuse.[430] The triple helix model might play a significant role to bring solutions to the above-mentioned challenges by regarding the following:

[427] Tu J, Gu S and Wu G, 2005, pg 168

[428] Tu J, Gu S and Wu G, 2005, pg 168

[429] Tu J, Gu S and Wu G, 2005, pg 168

[430] Tu J, Gu S and Wu G, 2005, pg 174

- The rational management of firms leads to proper incentives for researchers and secure efficiency of production.[431] It also stimulates the spirit of entrepreneurship and tolerance for risks and failures.[432]
- The universities faced a challenge(s) to close the gap of a lack of scientific skills and human capital in China's rural regions (Baoji city).[433] The scientific fundamentals have been incorporated into the evolutionary process of production and innovation.[434]
- The government of Baoji city has promoted cooperation in the most rural regions of Baoji.[435] This system (the triple helix model) was helping in these rural regions of Baoji, since the local government could not afford to provide subsidies to the rural population.[436] Therefore, they (the government of Baoji city), with limited funds, concentrated on the building of courtyards for agro-experts and, later, they functioned to improve regional development.[437]

The different versions of the triple helix model can be at odds with each other, both in theory and practice. Conflicts over the definition of "conflict of interests" among persons with dual institutional roles provide a strategic research site to assess these changes in perspective.

Competing hypotheses, derived from different versions of the Triple Helix, can be explored through formal modelling, and be appreciated through institutional analysis. In the longer term, the research program and the outcomes of model studies have to be evaluated as hypotheses and heuristics, while the case studies inform the modelling efforts about contingencies and boundary conditions.

The triple helix model is sufficiently complex to encompass the different perspectives of participant observers and from an analytical perspective, to guide us heuristically in searching for options emerging from the interactions. For example, one is able to distinguish between a specific configuration of university-industry-government relations and the transformation of the infrastructure in a knowledge-intensive economy.

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[431] Tu J, Gu S and Wu G, 2005, pg 174

[432] Tu J, Gu S and Wu G, 2005, pg 175

[433] Tu J, Gu S and Wu G, 2005, pg 175

[434] Tu J, Gu S and Wu G, 2005, pg 175

[435] Tu J, Gu S and Wu G, 2005, pg 175

[436] Tu J, Gu S and Wu G, 2005, pg 175

[437] Tu J, Gu S and Wu G, 2005, pg 175

The systems of reference are different: Which evolutionary forces drive the transformations? What stabilises the institutions? Theoretical analysis reflects on these distinctions with the aim of providing the participants in the respective discourses with windows that will enable them to explore new combinations.

5.5.3 Analysis of the Triple Helix Model

There is growing research on innovation, innovative systems in the city, national and regional innovative systems, and science parks.[438] The interest in these phenomena show no decline, with more than 200 regional innovation systems studies published between 1987 and 2002, and new papers published monthly.[439] Saxenian says it is fair to say that this interest has been sparked by the initial success of Silicon Valley and Route 128, in South-West Finland, in the mid-1970s.[440] Although both areas experienced a slowdown, from which Route 128 did not manage to recuperate until much later, these two areas became role models for similar types of technology-based agglomerations worldwide.[441] The other spark is certainly the consensus on that technology development, R&D, and that innovations impact positively on national and regional wealth creation.[442] An overwhelming characteristic of the research seems to be that most studies are no macro-levels either, firms, industries or regions. The existing literature also shows the usefulness of the national innovation system for institutions devoted to innovation.[443] Despite this massive body of research, a single definition of an innovations system seems to be missing.[444] The core of the national innovation system (NIS) is interrelated institutions - those institutions that produce, diffuse and adapt new technological knowledge, such as industrial firms, universities or government agencies.

Complementing research on national innovation systems is another large body of research that focuses on regional innovation systems. These studies have studied why some firms choose certain locations and factors that influence the choice.[445] The governmental agencies, the city itself, and the surrounding municipalities, as well as the universities, are strong actors

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[438] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 2

[439] Cooke P, 2005, pg 34

[440] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 4

[441] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 4

[442] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 4

[443] Niosi J, 1991, pg 86

[444] Niosi J, 2002, pg 292

[445] Bathelt H, 2001, pg 288

in setting up the following: institutions, science parks, research parks, technology centres, innovation centres, incubator centres, start-up initiatives and business parks. Some studies have suggested that the success of regional clusters depends on agglomeration and urbanisation benefits to new firms, rather than the proximity to universities and other small technology-based firms.[446] This institutional approach appeals to those who desire a top-down view of innovation systems. However, it needs not address the functionalities of those institutions, particularly from the perspective of the individuals immersed and, presumably, the intended beneficiaries of the innovation system.[447]

Zucker, Darby and Amstrong show that small firms emerging in close proximity to world-class science institutions are more successful.[448] It is also interesting that their research has proved that top scientists, who work in close proximity to start-up technology firms, become better scientists because they ask better questions early in their careers and become widely cited.[449]

Other scholars argue that organisational patterns and manufacturing cultures, embedded in the socio-institutional tradition of a particular region, are decisive.[450] The effects of science parks on the creation of firms have also been perceived as a form of public sponsorship of entrepreneurial activity. In respect of sponsorship, questions have been raised related to a potential competitive imbalance relative to existing firms, and how science parks will influence patterns of cooperation and the effective use of resources. Westhead and Martin argue that, implicitly, this appears to be much more a policy makers' issue than an actual primary concern of small firms, or the entrepreneurs who run those firms.[451]

Regional innovation systems are seen as learning systems of national economies,[452] and a large body of studies around firms' ability to create, disseminate and diffuse new knowledge also exist.[453] The striking characteristic of these studies is the institutionalisation of the phenomena regardless of whether it is at national or regional level. Most studies are on a

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[446] Westhead P, Bastone S and Martin F, 2002, pg 9

[447] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 4

[448] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 5

[449] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 5

[450] Bathelt H, 2001, pg 289

[451] Westhead P, Bastone S and Martin F, 2002, pg 10

[452] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 5

[453] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 5

macro-level and rarely, if ever, discussions are mentioned related to the entrepreneur or the innovator.[454] That is, the actor that must make the venture work is largely ignored. The wide range of terms deployed include: infrastructure, globalisation, asymmetric knowledge, dynamics capabilities, innovation networks, knowledge spill-overs, technology transfer, region, city, national policy, etc.

The innovation systems model that has been well mentioned and has gained an increasing numbers of adherents is the triple helix. Although Cooke criticises it to be on an extremely high level of abstraction, it is a model on which many current innovation systems appear to be based.[455] The Swedish national body that is promoting innovation and technology (VINNOVA) openly declares that their system is based on the triple helix model, as is the Finnish system embodied by the National Technology Agency (TEKES) and the regional incubators.[456] Triple helix basically provides a model for integrating governmental institutions (i.e. the city), university and industry to boost innovate activities and technology development.

5.5.4 The Emergence and Transition of the Triple Helix

The triple helix system is said to be positive synergy among the three different actors in knowledge spill-overs. The model engages the university as the centre of excellence with its academic-based research and development activities. Industry is the provider of the customer's demand, based on its commercial activities, as well as research and development. The government is a policy maker. The integration of these different actors lies at the heart of the triple helix system that ideally will increase knowledge spill-overs in the city. Therefore, this caused the increase in the competitive advantage of the economic development of the city.

The hands-on strategy requires a greater science and technology policy capacity on the part of the state (city), industry and academia, since the judgements of the level and type of intervention in particular areas become more critical.[457] Therefore, the central issues are the synergy among the three different actors in societies, reflecting different traditions of political

[454] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 5

[455] Cooke P, 2005, pg 38

[456] Brannback Malin, Carsrud Alan, Krueger Norris Jr and Elfving Jennie, 2007, pg 5

[457] Etzkowitz Henry and Leysdesdorff Loet, 1998, pg 198

economy, and different levels and types of economic development, including the macro- and micro-economics of each particular city.

The concept of the cluster and its benefit in the triple helix system receives attention as the cluster is a geographically proximate group of interconnected companies and association of institutions in particular fields, linked by communalities and complementarities. Porter argues that the geographic scope of a cluster ranges from a region, state or even a single city nearby, or neighbouring countries that also relate to the distance over which information, transactional, incentives and other efficiencies occur.[458] A cluster encompasses an array of linked industries and other entities important for competition. This includes suppliers of specialised inputs, such as components, machinery and services, as well as providers of specialised infrastructure.[459] Many clusters include governmental and other institutions, such as universities, think tanks, vocational training providers, standard setting agencies, and trade association, to facilitate specialised training, education, information, research and technical support.[460] Clusters can occur in many types of industries, in smaller fields, even in some local industries, such as management consulting firms, auditing firms, etc. They exist in large and small economies, in rural and urban areas, and at several geographic levels, such as national, regional, metropolitan and urban levels.

New codes of communication are being developed at all interfaces. For example, science is no longer valued as only a quest for truth but, also from the perspective of utilisation of systems, legal systems have been developed with the aim of supporting innovate processes, industries have been transformed and restructured both from the perspective of control and of adaptation to new technological options. The institutions are involved in the transitions that result from their interactions.

To take the evolutionary metaphor, the perspective can be considered to be a genotype that reflects on specific interactions within and among the helices, while the complex dynamics of innovation are phenotypical, that is beyond the control of any given perspectives.[461]

Knowledge-intensity induces differentiation between a strategic level and an operational level in the organisations involved.[462] Both levels can be made relevant, by not allowing for rigidly

[458] Porter M E, 1990, pg 92

[459] Bathelt H, 2001, pg 292

[460] Bathelt H, 2001, pg 292

[461] Etzkowitz Henry and Leysdesdorff Loet, 1998, pg 198

fixed boundaries.[463] Participants at one level of networking can use collaborations or boundaries at other levels as resources.[464] Conflicts have to be addressed and elaborated into codifications.

The established systems try to retain contributions by reproducing themselves.[465] Thus, the network is expected to contain tendencies towards both integration and differentiation. Whereas each co-evolution exhibits a tendency towards mutual shaping and thus stability along a trajectory, the complex dynamics of a triple helix allows for reshaping of the trajectories on which the next-order system has to build recursively.[466] The capacity of relevant participants needs to handle the complexity of the implied communications within the involved structures.[467] Not only should the substance of the communications develop, but also their codes.[468] By translating between codes, translators used to communicate reflexively about communications at the interfaces of the institutions involved.[469] While institutional and functional differentiations have tended to correspond as in a division of labour, one now may use the one differentiation to reorganise the other.[470] The coordination mechanisms of society have thus become further differentiated.

5.5.5 The Future of the Triple Helix in Mthatha City

The triple helix concept has been formed from an analysis of the university-industry double helix, and the realisation that government (the city) has been an essential part of the innovation equation.[471] The university is the key institution of the knowledge-based society.

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[462] Etzkowitz Henry and Leysdesdorff Loet, 1998, pg 199

[463] Etzkowitz Henry and Leysdesdorff Loet, 1998, pg 199

[464] Etzkowitz Henry and Leysdesdorff Loet, 1998, pg 199

[465] Etzkowitz Henry, 2006, pg 310

[466] Etzkowitz Henry, 2006, pg 312

[467] Adelaide Baeta discussed the learning capacity of technology transfer in the Brazilian context.

Herbert Fusfeld, former President of the Industrial Research Institute (IRI) and Director Emeritus of the Centre for Science and Technology Policy at Rensselaer Polytechnic Institute, noted how the meaning of technology transfer has evolved, from how R&D results are moved from central laboratories of companies to their operating divisions, from developed to developing countries, and from outside the company into the company.

[468] Etzkowitz Henry, 2006, pg 311

[469] Etzkowitz Henry, 2006, pg 312

[470] Etzkowitz Henry, 2006, pg 312

[471] Etzkowitz Henry, 2006, pg 314

It can be replicated and expanded more easily and quickly through knowledge transfer, than the industrial factory system.[472]

Etzkowitz argues that: "The spread of knowledge-based innovation collapses the time frame of the first great transformation, measured in centuries, into mere decades".[473]

According to the example, China (Baoji city) proved that university is stronger than industry and government in producing novel knowledge and forming new platforms for science-based industries. In comparison with Mthatha city, science-based industries do not participate in industry, or the university. The industrial innovation pays no attention to product development. Mthatha city does not have the capacity of basic research. However, the breakthroughs from basic research can result in significant innovation. The city of Mthatha has the potential to lead the formation of new firms and industries. This is the most important advantage of the increasingly central role of the university (WSU) in technological innovation.

If Mthatha city can pull the triple helix together, the following characteristics can be experienced. The city should initiate and control significant projects for social innovation. The research of WSU, the key research institution, should integrate with Mthatha city, as this university is currently establishing a Faculty of Agriculture and Rural Development Studies[474] to form an interactive triple helix with the industry.

If, for example, Mthatha can pull this triple helix, they will face the following advantages and disadvantages. The advantages include, but are not limited to, the following: they will easily achieve a large scale of innovation projects; they can re-organise the regional innovation resources; they can also fill the gaps, where necessary, to assist innovation in a particular region; they will attain consensus in regional innovation; and will also protect university interests in entrepreneurship through policies and organising activities more conveniently and building an innovation platform in the region of Mthatha.[475]

Disadvantages also include, but are not limited to, the following: the university-industry joint innovations exist, but all personnel, equipment and funds in the two parties, both from the state; university and industry, will possibly lose the flexibility to deal with problems in the

[472] Etzkowitz Henry, 2006, pg 314

[473] Etzkowitz Henry, 2006, pg 315

[474] Khuthala Nandipha, 2010. This has been extracted from the *WSU News Letter*, issue 11, April/May 2010

[475] Etzkowitz Henry, 2006, pg 318

innovation process; the two parties will have a tendency to rely excessively on government (city); this will result in passiveness and inertia; therefore, the financial burden on the city will become excessively heavy as university and industry cannot play any significant role in knowledge production and technological innovation. That means that the city will need to pull university and industry forward.[476]

An active civil society in the Mthatha city can be the key element that will characterise a fully functioning triple helix. In the *statist* model, civil society is often actively suppressed, and in the laissez faire model it is relatively inactive. The triple helix does not operate at its full potential as a top-down model. A triple helix, co-ordinated entirely by the state, only provides a limited source of ideas and initiatives from only one place in society.[477] For the triple helix to operate fully, there must also be initiatives arising bottom-up and cross-wise from the various institutional spheres.[478] An assisted linear model of organisational, as well as technical, innovation is embedded in a flourishing civil society as an objective. Agnes Heller argues that:

> There is a university movement in this direction, the emergence of civil society is usually the outcome of a struggle with proponents of previous helix models and collaboration among actors seeking an enhanced version in which all partners have a say.[479]

This means that not only do universities play their traditional roles, but they also take some of the roles of other institutional spheres, such as the role of the entrepreneur in helping to see that knowledge is put to use.[480]

As the university (WSU) takes up this new role in promoting innovation, it will be transformed as well. As rural areas (society) take their new role in continually adapting and raising their technological level, they will become a bit more like the industrial and academic spheres in realising the importance of knowledge in creating this new economy and new society.[481] These innovations can originate in the local, regional and national contexts.

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[476] Etzkowitz Henry, 2006, pg 318

[477] Etzkowitz Henry, 2006, pg 320

[478] Etzkowitz Henry, 2006, pg 315

[479] Etzkowitz Henry, 2002, pg 3

[480] Etzkowitz Henry, 2006, pg 317

[481] Etzkowitz Henry, 2006, pg 317

The WSU innovations can be created to enhance the utilisation of knowledge in society in the city of Mthatha. This will represent an endless transition, since the utilisation of knowledge in the society will represent an endless transition.[482] They will always be subject to revision to take into account the changing markets and new opportunities.

5.5.6 Normative Implications

The triple helix model of innovation is the converging institutional spheres of academia, industry and government. Each takes the role of the other, and has been read in different ways in various parts of the world.[483]

Etzkowits argues that:

> In countries where the interface is well underway, whether occurring from the bottom-up, through the interactions of individuals and organisations from different institutional spheres, or top-down, encouraged by policy measures, the triple helix can be recognised as an empirical phenomenon.[484]

For example, the US has been seen to exemplify the former and Europe the latter mode of triple helix development.[485]

Etzkowitz also argues that

> Both types of triple helix development may actually be under way in the US and Europe albeit at different rates and with varying emphases. Top down processes can be identified in the US even though they are often hidden behind bottom up formats. Thus, Advanced Technology Program (ATP) program managers at the National Institute for Standards and Technology have been known to seek out technical leaders in industry to encourage them to initiate an industry led focus program. Nevertheless, as industry takes on the project as its own and draws academics as well, or vice versa, who can say where top-down ends and bottom-up begins. It may be more accurate to recognise both processes going on simultaneously and in tandem. Indeed, such

[482] Etzkowitz Henry, 2006, pg 318

[483] Etzkowitz Henry, 2002, pg 4

[484] Etzkowitz Henry, 2002, pg 4

[485] Etzkowitz Henry, 2002, pg 4

> a dual track for innovation promotion may be more productive than any single path.[486]

This is also similar in the following case, which appeared in Sweden when the young computer and business consultants joined to form an e-commerce firm.[487] A new development was at hand in a society whose industry, for several decades, was led by a definable group of large firms. Certainly, government supported entrepreneurship programs, and incubator facilities were available to support these initiatives.[488] Once again, bottom-up met top-down in a creative fashion. This created a broader context for innovation than would likely have arisen from either approach in isolation.

In other parts of the world, Latin America for example, where industry and university have traditionally existed apart from each other, with academia as part of the governmental sphere, the triple helix is sometimes regarded as a normative model.[489] Some view it as a goal to strive for in bringing change to enhance the prospects for innovation.[490] Other observers see the coming of the triple helix as representing the downfall of the existing system of innovation.[491]

There was a strong belief that the privatisation of companies will reduce the resources for Research and Development (R&D),[492] and will also include collaborations between the state-owned company laboratory and university researchers.[493] On the other hand, many of these collaborations were not sufficiently market driven.[494]

5.6 Conclusion

This chapter discusses some identified spatial characteristics of the postulated aspects of innovation (i.e. urban hubs, local links, cultural planning and a triple helix). These postulated aspects of innovation consist of its components, and it has been noted that innovation is explicitly uneven in the cities. The examples implemented showed that some cities have more

[486] Etzkowitz Henry, 2002, pg 4
[487] Etzkowitz Henry, 2002, pg 5
[488] Etzkowitz Henry, 2002, pg 10
[489] Etzkowitz Henry, 2002, pg 5
[490] Etzkowitz Henry, 2002, pg 5
[491] Etzkowitz Henry, 2002, pg 5
[492] Etzkowitz Henry, 2002, pg 5
[493] Etzkowitz Henry, 2002, pg 5
[494] Etzkowitz Henry, 2002, pg 5

factors conducive for innovation than others. For example, in the case of London and Mthatha, these case studies provide evidence that innovation in mature sectors is more embedded in a specific city environment. Therefore, London's urban assets, institutions and networks tend to be more developed than Mthatha's as regards their ability to support innovation within the city. This has been identified in Mthatha, as the city does not have development agencies that can help to facilitate and established networks. This can take place by taking initiatives to ease barriers to growth and development in innovative small and medium sized enterprises (SMEs). This can also take place by addressing the skills shortages or providing access to finance, as it has been established that firms in the city are the key actors in urban innovation. If, for example, Mthatha can provide a very reasonable proximity to the transport infrastructural developments to reduce travel times to and from the market and suppliers, then Mthatha can improve. For example, Mthatha could then attempt to attract businesses that may require access to markets in neighbouring cities, but do not necessarily want to relocate there. This can be one of the solutions to the high unemployment rate in the city of Mthatha.

Therefore, the two postulated aspects of innovation (i.e. the urban hub and local links), with their four components play a larger role to facilitate and enable successful innovation in the city. The firms use and combine the four components to develop innovation in the city.

In respect of cultural planning, it has been stated that cultural planning is a planning tool which can be innovative, and that it can assist in some of the challenges that face South African cities, such as Mthatha and East London. Therefore, it has been argued that cultural planning can be a solution to social issues, economic and physical developments in the cities of Mthatha and East London. Some examples have been mentioned, such as that of the Birmingham city, to illustrate how a city can be developed to international standards.

It was also demonstrated that, in other international cities, cultural planning is working, and Mthatha and East London could be revitalised through the use of cultural planning.

Lastly, the triple helix model has been discussed and Etzkowitz's definition has been adopted for this thesis. A triple helix, based on university-industry-government interaction, emphasizes the relative relationship between university, industry and government. The triple helix model in China (Baoji city) and Punjab, in one of the provinces in India, demonstrated the functioning of the model. On the one hand, either the university or industrial sector is

strong enough to become the organiser. Thus, government pulls the other two spheres to achieve regional innovation.

For example, it has been demonstrated that a rapidly growing public university system forms the basis of a government-pulled triple helix in Baoji city, China. Here, a state industry system is the other leg of the government-pulled triple helix model. Although China has tried to transform from a planned economy to a market economy since 1978, governments-central, province and local had tremendous administrative control. Private enterprises were increasingly significant as an economic factor, but the public-owned system retained a dominant position.

This provides evidence that a triple helix model can work for the South African society in general. For example, Mthatha needs to take the initiative of the WSU in establishing a Faculty of Agricultural and Rural Developments as a starting point to initiate a triple helix model. This will benefit the people of Mthatha by alleviating the high levels of poverty and unemployment, and increase the research capacity in this city.

Furthermore, there is a government agency in South Africa, the Council for Science and Industrial Research (CSIR) that works in a similar fashion to that of the triple helix model. This has been documented from their website, but there are no traces of a functioning triple helix model in Pretoria, where the three universities, i.e. UNISA, Pretoria University and Tshwane University of Technology, and the pool of industries in the city of Pretoria combine with the CSIR in a coordinated way. There is no motivated learning or interaction with its spheres (universities and industries) and no co-evolution of the tech-socio-economy is evident. Even so, the existence of the CSIR could be an initiating point for a fully fledged triple helix development in Pretoria.

5.7 Chapter Summary

The purpose of this chapter was to further explore the postulated aspects and recommended policies of innovation in the city. Section 5.1 gave the reader an overview of the research strategy used and briefly discussed the main sources derived therefrom. Section 5.2 discussed the “urban hubs” and its components, while section 5.3 focused on “local links” also with its components. Section 5.4 explored “cultural planning” in the city, while section 5.5 discussed the notion of the triple helix model and unpacked its background and how it works. Lastly, section 5.6 focused on concluding remarks for this chapter.

Chapter Six

Towards a Policy for Innovation in Developing Cities

6.1 Introduction

The objective of this thesis is to elucidate the relationship between innovation and cities in the era of knowledge economy. In this context, innovation is regarded as a process, and cities as the prime centres that facilitate this process in a knowledge economy. For this purpose, the researcher conducted a conceptual study that entailed a critical analysis and review of the literature on innovation, cities, and the knowledge economy in a manner that incorporates multiple views from various authors.

The purpose of this chapter is to make concluding remarks for the study and outline policy recommendations for innovation within the cities. It also provides suggestions for further studies to achieve a holistic innovative culture in the cities.

6.2 Discussion

The world's economy is changing as processes are becoming more transnational, affluence rises, and knowledge becomes a key element of countries' economies. In this context, where cities are regarded as places where most people live, work and consume, they have real opportunities to become economically successful, innovative, and high quality places in which to live and work.

Yet, cities also face real challenges to respond to changing and demanding markets in the knowledge economy, and to respond to social changes and the needs of their inhabitants who do not have skills and attributes to participate fully in the knowledge economy.

Globalisation has been taking place for centuries and, it is in the domain of understanding, that cities are facing massive challenges regarding opportunities and competitions. This causes cities to find themselves in a global space where they are compelled to compete with each other, even without a desire to do so.

This study has been done by using examples of international cities, such as London, Birmingham, Singapore, etc., and comparing them with two South African cities, i.e. Mthatha and East London. It was discovered that cities are explicitly uneven with regard to innovation.

The size of the city cannot be the key factor to determine growth, i.e. the city's annual GDP contribution. Instead, innovation is a determining factor with regard to the city's growth. It has been argued and demonstrated that innovation in the knowledge economy has become a key factor to issues of social, economic, and physical development in some international cities, like London and Birmingham.

City managers and national policy makers intend to seek economic growth by joining the global economy. They will benefit from this by being aware of the proper specific interventions,[495] by, for example, enhancing services and human resources to attract global activities, such as finance, trade and tourism, that will complement rather than tax their particular city's existing strengths.

It has been demonstrated that innovation is a work process and it requires knowledge to overcome its multi-dimensional perspectives. This knowledge must be codified, embedded and embodied in the city. The very same knowledge is also an important source for continuous improvement of goods, services and processes.

In the study, it was discovered that innovation is based on the innovative resources in a city, such as firms, talented or skilled people, the flow of information, availability of funds, etc. Innovation has an effect on the economy and society in general. This effect causes a change in customers' behaviour, and people in general within the city, in a process in how people work and render services.

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[495] See the aspects and policies (urban hubs, local links, cultural planning and triple helix) of innovation in Chapter five

The successes of cities, municipalities, enterprises, etc. depend on their effectiveness in gathering, absorbing, and utilising knowledge and their creation of new knowledge.

In this thesis, it was discovered that knowledge economy is accelerated by the rate of change and the rate of learning. Therefore, cities must become learning organisations, and have a management that continuously adapts as regards organisation and skills to accommodate new technologies.

In view of the success stories of Birmingham, London and Singapore, the cities of Mthatha and East London could be revitalised through the use of innovative aspects and policies (urban hubs, local links, cultural planning and the triple helix) postulated to bring a better innovative city culture.

It has been discovered that the two South African cities of Mthatha and East London are not innovative, because they are far behind in providing a quality of life, access to critical infrastructure and social services. This implies that it would be imperative to seriously rethink the generative potential of innovation in these cities' knowledge economy.

During the comparison of South African cities, like Mthatha and East London, with other international cities, like Birmingham, London, Singapore, it was discovered that these South African cities are not doing well regarding innovation. These cities need a lot of innovation to uplift their standards. They are facing multi-dimensional challenges, such as town planning, finding more skilled knowledge workers, installing better management, their immature politics (a poor political landscape), poor understanding of economic structures in the their regions, etc. These challenges have caused the following deplorable conditions: urban poverty, a high rate of unemployment, traffic congestion, rising crime, infrastructural constraints, non-functioning street lights, etc. In these two South African cities, these conditions have created problems for governance.

In general, that is why, in almost the whole of South Africa, there have been public riots for service delivery, which took place in late 2009 and early 2010.

In consideration of the above challenges and deplorable conditions in the cities of Mthatha and East London, it has been postulated that an innovative city culture will contain at least the following four aspects and policies: urban hubs, local links, cultural planning and the triple helix model.

This thesis has discussed the urban-hub approach that considers a city's market size and asset base, which are critical to support higher levels of innovative activity. Local links consist of

institutions and local networks; they bring innovation to sectors that are dominated by small firms and individuals; it has been discovered that firms are the key actors in urban innovation. The above four components are to the advantage of cities, where they mainly serve to facilitate and enable their successful innovation. Firms use and combine these four components to develop innovations.

Cultural planning has been defined and substantiated conceptually so that it can be an aspect which can be innovative in the city. It has been discovered that cultural planning is relatively unknown in South Africa. The example of the Department of Arts and Culture has demonstrated this, and has caused tremendous chaos, degeneration, decay and decline of central business areas in cities of South Africa. The Birmingham city demonstrated the opposite of what the South African cities do with regard to cultural planning.

It has been demonstrated that knowledge-based institutions, like the universities, industries and government (city), can have equal roles and form a triple helix model in stimulating innovation. The triple helix model is a model that has been used mainly to analyse innovation in a knowledge-based economy.

A stable regulatory framework is necessary but not a sufficient condition to run this type of model. The transformation of a university from a teaching, to a research, and then to an entrepreneurial institution is vital. City managers must help to support the new developments through changes to the regulatory environment, tax incentives and provision of public venture capital. Industry takes the role of the university in developing training and research, often at the same high level as universities. If knowledge-based industries lack university-government interactions to help to jumpstart their creation, then they are not innovative enough to expand their growth and meet the city's challenges.

This thesis used examples of Asian countries, like India and China, to demonstrate that the triple helix can be an innovative aspect in a city. According to the example of China, it has been demonstrated that universities can be stronger than industries and government in producing knowledge and forming new platforms for innovation; in comparing Mthatha city, it has no participation of industries or universities. Therefore, industrial innovation pays no attention to product development. They also do not have the capacity of basic research. For example, if Mthatha city can pull the triple helix model together, the following characteristics can be experienced: the city should initiate and control significant projects for social

innovations. The WSU[496] should be the key research institution, and should integrate with this city to do social innovation in the city. That will benefit the residents of Mthatha with regard to alleviating the high levels of poverty and unemployment, and increase the research capacity within that region. The triple helix maintains the sustainable development of the industry-university integration. It is important for government to support this synergy, as it will play the role of policy-making that provides the necessary tools to encourage local regions within the city. This produces evidence that a triple helix model can work for the South African society in general.

6.3 The Challenges of the South African Cities and Recommendations for Possible Solutions

In South Africa, the issue of sustainable development concerns not only the state's natural resources and their management, but also the issues of equitable development and the struggle against poverty. This development is sustainable if it meets the needs of the present generation, without compromising the ability of future generations to meet their own needs. It also includes questions concerning public participation and citizenship.

Sustainable development is about equity, defined as equality of opportunities of well-being, as well as about comprehensiveness of objectives.

Cities to achieve a sustainable development need to be innovative, or need to have an innovative culture.

The rate of growth of South African cities is amongst the most rapid in the world and, in some cities, the concentration of the South African population is as much as 60% of the total population in many countries,[497] but, at the time of independence, the rate of urbanisation was relatively weak.

However, the differences in the economic crisis experienced by the majority of people, has forced rural populations to migrate to urban centres that offer neither economic opportunities nor a good standard of living. Today, the development of South African cities raises issues that relate to employment, especially for the youth, urban planning, urban management, social services (health, education, transportation, energy, and culture), infrastructure, food

[496] Previously known as University of Transkei before 2005

[497] Harrison K, 2009 (www.citythinkspace.com)

security, and public participation, as well as the issues of violence, urban poverty and pollution.

Over the past 15 years, the urban development policy for South African cities has often tried to mimic models based on current European urban development policies, which include infrastructural policy, housing, health and administrative organisation.[498]

These policies are often too expensive for local governments to implement, resulting in the construction of unmanageable human settlements, together with the marginalisation of large parts of the urban population. This mimicking of European urban policies proves that that is why urban policy makers in South Africa continue to have a negative attitude towards the urban informal economic sector. This part of the economy is sometimes responsible for up to 60% of South Africa's GDP.[499] The informal economic sector employs a large proportion of urban workers and provides goods and services at affordable rates for a population with a limited purchasing power.[500] It has always been considered that the informal economic sector is illegal and that it should be replaced by a more formal economy. Thus, the actors within the informal economy are constantly being advised to conform to the rules and regulations of the said formal economy. However, these cities are in crisis and find themselves incapable of providing the necessary goods, services and employment demanded by the population, especially the youth.

For many years, the focus of urban studies has been on Asia and its large and fast growing cities.[501] Only recently, researchers have begun to examine the multiple critical stresses caused by rapid urban growth, but rapidly growing globalisation across South African and African cities. While there is a debate on the accuracy of data on South Africa, because of the inconsistency of census rounds across the nine provinces of the country, no one doubts the grave situation that is unfolding in cities and towns across the country. Urban researchers believe that the fairly accurate population projections presented by the United Nations in the past, and the current data on urbanisation prospects from the same source have to be taken very seriously.[502]

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[498] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

[499] Harrison K, 2009 (www.citythinkspace.com)

[500] Harrison K, 2009 (www.citythinkspace.com)

[501] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

[502] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

At about 3.3% to 3.7% annually, the South African urban population growth rate has been, and will continue to be, the highest in the African continent, although the African city-based populations are growing faster than their counterparts in Asia.[503] These higher population growth rates, compared with other regions of the world, are expected to continue well into the next two decades. As a result of this very rapid rate of population growth, city residents are expected to exceed the rural population by the year 2030.[504] These projections hold despite a general slowdown in urbanisation across the world; urban growth from 2000 to 2005 was lower than that experienced in 1995 to 2000.[505]

Severe problems associated with the rapid urban population growth across South Africa have to be seen in their context despite the existing local urban conditions, which have been highlighted by city level indicators, i.e. city crime rates, travel-to-work times, waste collection and treatment, health and education, urban local government revenues and local economic performance.[506]

Today, South Africa has been characterised by population concentrations in one or two major cities (e.g. Johannesburg, Cape Town or Durban). However, there is rapid growth in medium and small cities. The unprecedented accelerated pace and extent of urban population growth in the country with a huge backlog of service delivery and hard infrastructure will continue to exert pressure on national and local policies, as well as approaches to urbanisation.

At a similar time in the country's developmental timeline, rapid urbanisation was accompanied by supportive economic growth. Therefore, to some extent, some cities are able to put some supportive structures in place, such as the design and implementation of effective plans and initiatives at the level of local urban government that will be a key to managing the situation. Such approaches necessitate broader national strategies that are thoroughly contemplated and structured to provide support for local concerns.

Yet, city managers and other local municipalities control a very small portion of policies that have an impact at city level.[507] Stren and Mitullah argue that some cities are so open that there is not much policy bite at city level.[508] Most of what cities need to respond to in the

[503] Harrison K, 2009 (www.citythinkspace.com)

[504] Harrison K, 2009 (www.citythinkspace.com)

[505] Harrison K, 2009 (www.citythinkspace.com)

[506] Harrison K, 2009 (www.citythinkspace.com)

[507] Leautier F A World Bank, 2006, pg 72

[508] Leautier F A World Bank, 2006, pg 71

areas of health or education, and even in infrastructure, is the prerogative of the national policy maker.[509]

Recent research proves that many of the city-level characteristics depend on the performance of local governments.[510] In particular, the ability of local governance to incorporate the voices of its citizens, to establish transparency in the decision-making process and to combat corruption seems to have an effect upon some city-level qualities. So, there seems to be a possibility for city managers to have an impact, and this affords the opportunity to test some of the trade-offs between the city level and national policies.

The expectation is that South African cities may have three times more households who live under the poverty line than the average for cities in less globalised countries, even though this figure is about the same as in Arab States and Latin America.[511]

This provides further support for the perception that, in South Africa, there is urbanisation without globalisation, without having experienced the benefits of either urbanisation or globalisation. Thus, due to innovation, globalisation can be a major force for poverty reduction, especially in urban areas.

The above examination reveals considerable positive linkages between a country's level of globalisation and the performance of its cities. It appears that, when a country has higher levels of globalisation, its cities are less congested, they offer comparatively more efficient transportation choices, manage waste better, and provide higher levels of education and better health services for their citizens. They also have relatively better performing local urban governments. Such cities also deliver higher levels of economic performance and are able to manage poverty more effectively.

6.4 The Policy Recommendations for Innovation in the City

Innovation in the city brings great transformation. The city can gain the stability of innovation within itself, perhaps by using the policy recommendations of innovation in the city that are as follows: integration of innovation resources, industrial innovation development strategies, excavation of knowledge to promote innovation, cultivating the innovation environment, carrying out city management innovation, and shaping the innovative image.

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[509] Leautier F A World Bank, 2006, pg 72

[510] Leautier F A World Bank, 2006, pg 71

[511] OECD, 2006, (http://www.oecd.org/document/06/03343,html accessed on 04-10-2009)

6.4.1 Integrating the Innovation Resources within the City

Innovation is based on innovative resources, including skilled people, information, knowledge, funds, etc. The key to independent innovation is a talented or skillful person. The introduction of skilled persons follows the introduction of information, knowledge and funds. The city's solid industrial foundation must train many skilled industrial workers. For example, Mthatha city has resources, but lacks a large number of technically skilled people in the resources industry, managerial skills, etc. This means that, if cities change the economic development pattern with the manufacturing industry or rural development programs (like the agricultural pattern), then they must consider the questions of skilled people, information, knowledge, funds and the industrial shift. The introduction and the integration of innovation resources need a policy and a well-established plan to safeguard stability. Advanced management can be introduced, as well as the effective experience of a well-developed transformation exchange from the triple helix (e.g. in the case of Mthatha and WSU, to import some skilled people from the Punjab province, India). They will provide and guarantee the normal development of scientific research, will establish the development of processes, transformation and the application of a management mechanism for technical and new products, and establish a pool of skilled people.

Finally, this will strengthen the staff culture, skills, provide formal education to train management, introduce skilled people with multi-specialties of technology, provide stability in scientific research, innovate the co-operation and development of the market, including enterprises, the university, research institutions, facilitating agencies, and the city.

6.4.2 Industrial Innovation Development in the City

The establishment of a new connection of industries is the essential part of developing cities' industry reforming strategy. Objectively, these developing cities' traditional industry will occupy the dominant position for a long time. But, in order to adapt, they require new economic development. Developing cities should improve their technological innovation and insist on transforming traditional industries and develop emerging industries. The traditional, old existing industries can be promoted by applying high technology.

Secondly, enlarging the investment of non-resources industries by choosing from the emerging non-resources industries has a competitive advantage towards development of modernised cities. This should strengthen the optimised work of industry and focus input on

resources, such as the electronic, information, and pharmaceuticals industries, and other domains, which form benefits from the economies of scale.

Developing cities must have competitive power in their competition, and they should prioritise their characteristic industries. But, the characteristic industries must not be the leading resources industry. The city that can realise a new economic point of growth, which transforms and grafts the resources of the leading industries, can also choose the original leading industry as its characteristic industry, and set up an industrial brand for the city. The city that transforms a traditional industry, can develop its new leading industry according to its other resources and geographic superiority, such as developing a high and new technological industry, modernising agriculture, etc.

6.4.3 Excavation of Skills to Promote Innovation in the City

The developing cities should have well-trained large numbers of skilled industrial people. They should adapt to the agricultural industry, processing industry, manufacturing, etc. But, it is difficult to produce a foundational enterprise. Excavation of skills includes the training of entrepreneurs and offering an environment conducive to trading. The cities that lack resources are less attractive to skilled people and are unable to perfect the functions of the developing city to achieve omni-directional co-ordinated development in the economy and society.

Cities need to excavate the knowledge atmosphere and environment that need policy support that could encourage the establishment of small- and medium-sized enterprises. With tax revenue and a financial policy, the developing cities can develop agency organisations, such as legal consultations, property appraisals, small- and medium-sized enterprises, etc. In order to provide the necessary technical services, building up the marketing and perfecting its operational mechanisms encourage the production of innovative achievements, such as patents, invention, etc.

6.4.4 Cultivating Innovation Environment in the City

An innovation environment is a safeguard for maintaining and promoting innovation, which mainly includes soft and hard environments. The soft environment consists of an innovation policy, innovation laws, regulation, culture, and so on. The hard environment consists of transforming networks, a scientific research facility, an external environment, such as participation in international competition and co-operation. A sole economic structure, sole

employment structure and a sole system of ownership structure are the characteristics of developing cities. These characteristics cause developing cities to lack a vigorous and innovation atmosphere. The introduction of developing cities cannot depend only on government's guidance and plan of direction. It also needs to switch to cultivating a culture and environment for innovation. This will promote the independent innovation ability of the city, by guiding the market force.

A concrete procedure consists of the following three prospective cases: the first is building the innovation culture. Cities should explore positively and experience a gradual increase of scientific institutions, the academia and the growth environment of skilled people, as they will guide the entire society towards innovation, encourage exploration, and resist defeating the innovative cultural atmosphere. The second is to optimise the innovation service environment. This will establish the region's innovation systems and technical service platforms. Cities should develop productive service efficiency and the government's service level. They should form a cooperation network among enterprise, the university, the scientific research institute and the government. The third is to display the leadership foundation of the government's support, the industrial policy support, and increasing investment scale of the research and development to form a systemic and organised industrial technological innovation mechanism.

6.4.5 Carrying out the City's Management Innovation

To enhance the innovation ability of developing cities, the system innovation must guarantee the promotion of an innovative city culture in the cities, which should strengthen co-ordination and the cooperation of the government and local enterprise. On the one hand, they may adopt an overlapping assignment and solve the major issues that appear in the production, the construction and the sustainable development. On the other hand, they may clearly refine the duties within government and enterprises in order to enhance the fulfilment of the functions of all quarters, the overall planning for the use of funds and the efficiency of each resource.

6.4.6 Shaping the Innovative Image of the City

Some of the developing cities are famous for being rich in resources. By facing the realistic situation, the amount of resources decrease progressively every year, which means that shaping the city's innovative image is also an important aspect for promoting the city's innovation ability. The external appearance and the image of a city are kinds of "soft

strength" and soft competitive power which manifests istself civic culture. If developing cities want to surpass other urbanised cities with high levels in a short time without massive investments, they should apply innovative considerations to attain a civilised city, an ecological city, a botanical garden city, a moving city, an emerging industrial brand of city, and so on. Simultaneously, it should emphasise promotion of the establishment of the city's brand, as well as the promotion of propaganda dynamics.

6.5 Suggestions for Further Studies

This is not an empirical study that means that this research material has been written and not gathered from the field. This thesis has been created from conceptual themes and concepts on innovation in the city and also postulates that an innovative urban culture must contain at least the following innovation aspects and policies: urban hubs, local links, cultural planning and a triple helix.

However, if one conclusion is to be made from this study so far, it would be that conceptual analyses will not provide all the definitive answers. Many of the answers, therefore, lie in the field. Interesting questions concerning aspects of innovation and policies in the developing city of the 21st century include at least the following.

Firstly, is there a way to directly assist the innovation of new work practices? The innovation aspects and policies highlighted in chapter five are simulation type methods that also affect everyday work practices. Yet, considerating innovation seems to place a heavy emphasis on making sense in actual work situations. The development of innovative aspects that can be used while immersed in doing the actual work is an important challenge to be studied in South African cities.

Secondly, what are the roles of management and personnel in innovation practices? The only research on this subject that has been found was done by Prof. Henry Etzkowitz regarding the formation of triple helices. When a choice was made, it was found that many of the innovation studies are concerned with management sense-making. This is a problematic deficit in the field, since it makes the study of real-life organisations or cities much more difficult. How can innovation be affected by management's sense-giving? Can managers comprehend the innovation processes at an operational level without having become experts in these operational activities? What is the role of middle management in this context? This is essential to the second phase of the cities in South Africa.

Thirdly, how is innovation linked to the systems and structures of the organisation? Can this process be affected by management's communication? How should this communication take place in different contexts? The scope of this thesis did not allow for an in-depth investigation of structural or systemic viewpoints. An interesting topic for further research would be to investigate the way, for instance, for goal-setting, rewarding changes in the city's structure and responsibilities that are interpreted and enacted.

Fourthly, is participation in strategy planning a positive factor that affects sense-making in a city's innovation? What level of participation is desired and what is the most satisfactory level, taking into account the resources demanded by participation?

Fifthly, is there a role for tacit and explicit knowledge in innovation? How much of the personal and cultural tacit knowledge that affects innovation can be made explicit? This is a challenging area of special personal interest that needs to be pursued in future.

Finally, a natural area for further research is empirical testing regarding the postulated aspects and policies of innovation which have been explained in this thesis.

Experience in testing these innovatiive aspects in practice should provide the final word on the validity of the choices made in this thesis.

6.6 Chapter Summary

The purpose of this chapter was to make concluding remarks about the research. Section 6.1 outlined the purpose of this study and its strategy in this chapter's structure . Next, section 6.2 discussed the concluding remarks on the research. Section 6.3 outlined policies, challenges and recommendations for possible solutions for South African cities, while section 6.4 explored the recommendations for innovation in the city. Finally, section 6.5 provided suggestions for further studies.

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